DOE/MC/29309 -- 4056
(DE95009708)

Tracy Power Station -- Unit No. 4
Piñon Pine Power Project
Public Design Report

Topical Report

December 1994

Work Performed Under Contract No.: DE-FC21-92MC29309

For
U.S. Department of Energy
Office of Fossil Energy
Morgantown Energy Technology Center
Morgantown, West Virginia

By
Sierra Pacific Power Company
Reno, Nevada

DISCLAIMER

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By
Sierra Pacific Power Company
P.O. Box 10100
6100 Neil Road
Reno, Nevada 89520-0400

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GLOSSARY

ACFM	Actual Cubic Feet per Minute
BFW	Boiler Feed Water
Btu	British thermal unit
$CaCO_3$	Calcium Carbonate
CaO	Calcium Oxide
CaS	Calcium Sulfide
$CaSO_4$	Calcium Sulfate
CEMS	Continuous Emissions Monitoring System
CFM	Cubic Feet per Minute
COS	Carbonyl Sulfide
DAS	Data Acquisition System
DC	Direct Current
DCS	Digital Control System
DHEW	Department of Health, Education and Welfare
DOE	U. S. Department of Energy
EHSS	Environmental, Health, Safety and Socioeconomic
EIS	Environmental Impact Statement
FW USA	Foster Wheeler USA Corporation
GPM	Gallons Per Minute
H_2O	Water
H_2S	Hydrogen Sulfide
Hg	Mercury
HgA	Mercury Absolute
HHV	High Heating Value
HRSG	Heat Recovery Steam Generator
HVAC	Heating, Ventilation, Air Conditioning
I/O	Input/Output
IGCC	Integrated Gasification Combined-Cycle
ISO	International Standards Organization
KRW	Kellogg-Rust-Westinghouse
kW	Kilowatt
kWh	Kilowatt hour
LASH	Coal ash with spent limestone
LHV	Low Heating Value
MCE	Maximum Credible Earthquake
MW	Megawatt (1 million watts) or Molecular Weight
MWe	Million Watts
MWK	M. W. Kellogg Company
NFPA	National Fire Prevention Association
NiO	Nickel Oxide
NIOSH	National Institute of Occupational Safety and Health

NiS	Nickel Sulfide
NO_X	Nitrogen Oxides
O	Oxygen
OSHA	Occupational Health and Safety Act
P.I.V.'s	Post indicator valves
PDU	Process development unit
pf	Power factor
PON	Program Opportunity Notice
ppmv	Parts per million by volume
psia	Pounds per square inch, absolute
RH	Relative Humidity
RIE	Remote Instrument Enclosure
RPM	Revolutions Per Minute
SCFM	Standard Cubic Feet per Minute
SO_2	Sulfur Dioxide
SO_x	Sulfur Oxides
SPPCo	Sierra Pacific Power Company
SUFCO	Southern Utah Fuel Company
TPD	Tons Per Day
TPH	Tons Per Hour
U/G	Underground
UPS	Uninterruptible Power Source
ZnO	Zinc Oxide
ZnS	Zinc Sulfide

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1.0 INTRODUCTION

This Public Design Report describes the Piñon Pine Project will be located at the Sierra Pacific Power Company's (SPPCo) Tracy Station near Reno, Nevada. The integrated gasification combined-cycle (IGCC) plant is designed to process 880 tones per day (TPD) of bituminous coal producing approximately 107 gross megawatts of electric power (MWe). This project is receiving cost-sharing from the U.S. Department of Energy (DOE) in accordance with DOE Cooperative Agreement DE-FC21-92MC29309.

The plant incorporates the Kellogg-Rust-Westinghouse (KRW) fluidized bed gasification technology which produces a low-Btu gas which is used as fuel in a combined cycle power plant which has been modified to accommodate the fuel gas produced by an air-blown gasifier. The gasification system also includes hot gas removal of particulates and sulfur compounds from the fuel gas resulting in a plant with exceptionally low atmospheric emissions. Desulfurization is accomplished by a combination of limestone injection into the KRW fluidized bed gasifier and by a transport reactor system. Particulate removal is accomplished by high efficiency cyclones and a barrier filter.

The Piñon Pine Project Schedule is divided into three phases as shown in the Project Schedule on the following Page. Phase I includes permitting and preliminary design. Phase II, which overlaps Phase I, covers detailed design, procurement, and construction. Phase III will cover the initial operation and demonstration portion of the project.

The Budget Periods are also shown on the Project Schedule along with major project milestones. Budget Period 1 ($42,980,000) funds permitting and pre-design. Budget Period 2 ($186,681,000) covers detailed engineering, procurement, construction, and start-up. Budget Period 3 ($104,690,000) will fund the operation and demonstration phase.

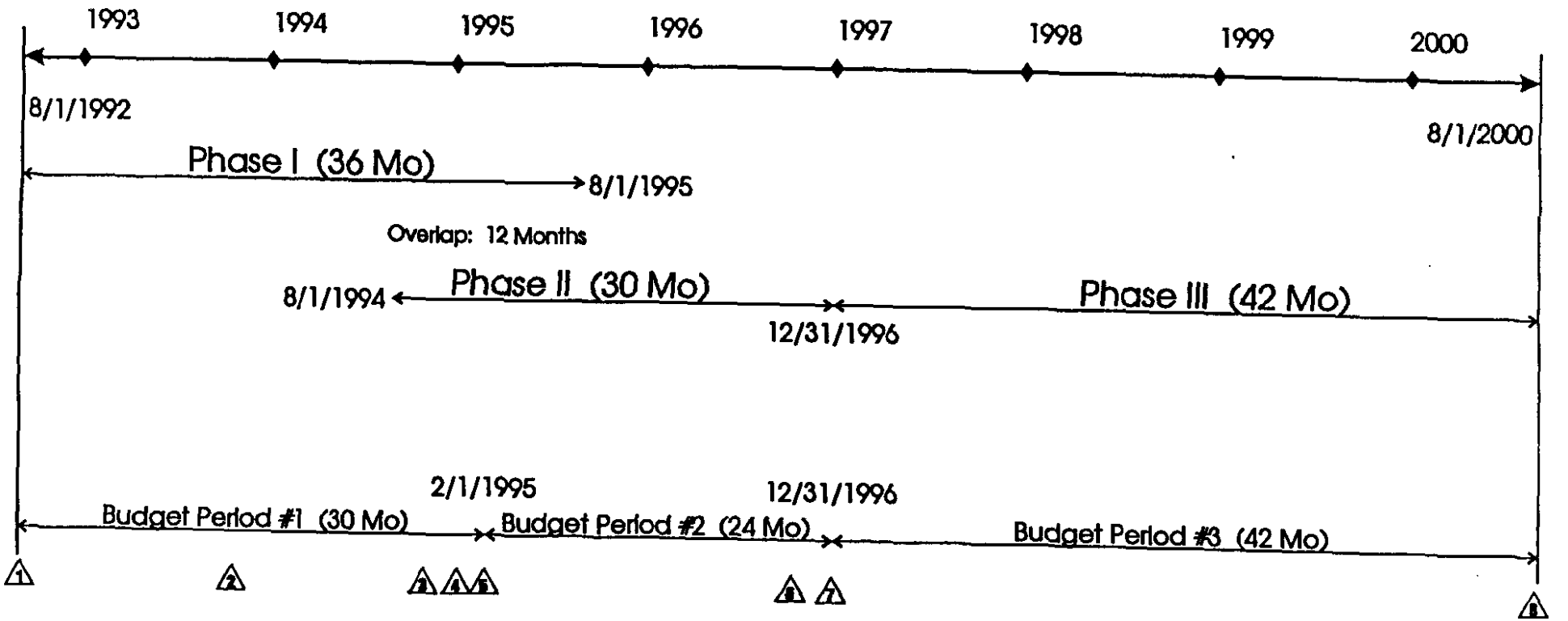
2.0 PROGRAM BACKGROUND

In January 1991, the DOE issued a Program Opportunity Notice (PON) soliciting proposals to demonstrate clean coal technologies that were capable of being commercialized in the 1990's. These technologies were to be capable of achieving significant reduction in the emissions of sulfur dioxide and/or nitrogen oxides and to provide for future energy needs in an environmentally acceptable manner. In response to the PON, DOE received proposals for projects that involved both advanced technologies that can be "retrofitted" to existing facilities and "re-powering" technologies that increase plant generating capacity, extend the operating life of a facility, and also reduce air pollution. The Piñon Pine Project proposed by SPPCo of Reno, NV was one of the nine projects selected for funding. The scope of theproject provides for the design, construction, and operation of an air blown KRW fluidized bed coal gasifier IGCC demonstration plant.

The Piñon Pine Project integrates a number of technologies fostered by DOE. Among these are the KRW fluidized-bed gasifier, in-bed desulfurization using limestone sorbent, and zinc based sorbent sulfur removal from a hot gas stream. DOE and its predecessor agencies have supported development of this fluidized-bed gasification technology since 1972 when the design of a process development unit

SCHEDC.CDR

Total Project (96 Months)



Milestone	Description
1	Project Starts - 8/1/1992
2	PSCN Approves Project - 10/25/1993
3	NEPA Completed - Record of Decision 11/8/1994
4	UEPA / Permits Approved - 1/4/1995

Milestone	Description
5	Construction Starts - 2/21/1995
6	Construction Complete - 10/17/1996
7	Startup Complete - 12/31/1996
8	Testing Complete - 8/1/2000

Piñon Pine IGCC Power Project Schedule

(PDU) was first initiated under contract with Westinghouse Electric Corporation. Construction of the PDU was completed in 1975 at Westinghouse's Waltz Mill Facility near Madison, Pennsylvania. From 1984 to 1988 the addition of dolomite and limestone sorbents to the gasifier bed for in-bed sulfur removal was successfully demonstrated at the PDU. These tests indicated that 85 to 90 percent sulfur removal efficiencies could be routinely achieved while using coal feedstocks containing 2 to 4.5 percent sulfur. In addition, the use of these sorbents in the gasifier was found to increase the product gas heating value while decreasing the production of ammonia, a major contributor to NO_x (oxides of nitrogen) emissions.

The Cooperative Agreement between SPPCo and the DOE was executed in August 1992. Foster Wheeler USA Corporation (FW USA) is providing engineering and construction management services for the project. The M. W. Kellogg Company (MWK) is providing engineering for the gasifier island. Start of construction is expected to begin by February 21, 1995 with operation scheduled for December 31, 1996.

3.0 TECHNOLOGY OVERVIEW

The Piñon Pine Project located at SPPCo Tracy Station will incorporate the KRW gasification technology which produces a clean low-Btu gas for use as fuel in a combined cycle power plant for production of low cost electricity in an environmentally sound manner.

The KRW process improves upon first generation IGCC technology in several aspects. Its pressurized, air-blown fluidized bed gasification technology will provide a higher thermal efficiency than a similar oxygen-blown system because it will consume less auxiliary power. A portion of the sulfur pollutants will be captured within the fluidized bed before they can exit the gasifier. Additional impurities will be removed through an advanced hot gas cleanup system which will operate with a regenerative sulfur sorbent to remove sulfur compounds, and with barrier filters to remove particulates. In addition, the inherent modular design of the system and simple process configuration will yield significantly lower engineering and construction costs.

Almost all of the previous IGCC demonstration plants were designed around a more conventional approach, i.e., gas produced in the gasifier was either quenched or cooled and scrubbed for low temperature removal of sulfur compounds. These plants also removed ash/slag in a wet state. In order to limit the size of cool down trains and desulfurizer systems, gasifiers for these early plants were oxygen blown, thereby adding to capital cost and parasitic power consumption. Cooling of gas for sulfur removal not only lowered the cycle efficiency, but also required extensive equipment and handling of process water.

In order to meet challenges of the market place and environment, a simplified IGCC system incorporating air-blown gasification with hot gas cleanup has been developed. By eliminating the oxygen plant and minimizing the need for gas cooling and wastewater processing equipment, the capital cost was reduced and plant efficiency improved. Key features of the simplified IGCC system are described below:

- Air-Blown Gasification

In the simplified IGCC system, about 15 to 20 percent of the gas turbine compressor discharge air will be extracted for use as oxidant in the gasifier. A booster air compressor increases the pressure of this extracted air to compensate for pressure losses through the gasifier and downstream hot gas cleanup system and fuel control valve.

- Hot Gas Cleanup

To date, most major gasification plants have utilized cold (wet) cleanup processes. The alternate approach of filtering the gas at high temperature enables the gas to maintain most of the sensible heat resulting in a higher plant efficiency. Equipment will be minimized and there will be no waste water production. Several types of filtering devices have been tested in pilot facilities and are available from several suppliers.

- Hot Gas Desulfurization

Sulfur contained in coal will be removed in two steps. Addition of limestone to the gasifier will capture the hydrogen sulfide produced in the reducing environment of the gasifier. Sulfur not captured by the limestone will leave with the product gas and be removed in an external desulfurizer system.

- Sulfation

Coal ash with spent limestone (LASH) contains calcium sulfide (CaS) along with unconverted carbon. The sulfator will oxidize the CaS produced in the gasifier into calcium sulfate ($CaSO_4$,), combust unconverted char and absorb sulfur dioxide (SO_2) in regeneration gas from the external desulfurizer system. Small amounts of transport and depressurization gas will also combust in the sulfator. The sulfator will operate as a fluidized bed. The heat generated will be removed by generating steam to maintain the bed material at a temperature of 1600°F. Additional heat will be recovered from flue gas exiting the sulfator by generating and superheating steam. The sulfated lash will be suitable for landfill. Results from the on-going bench scale testing are being used to develop design data.

4.0 DESIGN CONSIDERATIONS

4.1 Location and Description of Site

The site selected for the Piñon Pine Project will be the existing Tracy Power Plant located approximately 17 miles east of Reno, Nevada.

Tracy is a 724-acre site located in a rural portion of Storey County, Nevada, approximately 17 miles east of the Reno/Sparks area (population 250,000) and 15 miles west of the Town of Fernley (population 7,000) Nevada. U.S. Interstate 80 is immediately adjacent and provides easy access to the site. The site is capable of accommodating the gasification plant, power plant facilities and all support facilities, with minimal site work.

4.2 Area Geology

The proposed site is located in the Truckee River Canyon. Late during the Pleistocene Epoch, the Truckee River Canyon was occupied by Lake Lahontan, which covered an area extending approximately 40.2 km (25 miles) south from Pyramid Lake. As the lake receded, the Truckee River began to down-cut into the lake deposits and subsequently formed the present canyon. Where the river eroded away the lake sediments, it deposited fluvial channel (beds of river materials) and overbank deposits in their place. As a result, near-surface sediments at the site are composed primarily of river deposits consisting of minor clays, silts, sands, gravelly sands, sandy gravels, and coarse gravels. Lake deposits of clay, silt, sand, gravel, and calcareous tufa (porous stone containing calcium) may occur beneath the site. The most recent deposits are relatively thin eolian (windblown) deposits of silt and fine sand that mantle (cover) portions of the surface.

The hills south of the site consist largely of olivine basalt (rock of volcanic origin containing a mineral silicate of magnesium and iron) and hornblende andesite (mineral consisting of silicate of calcium, magnesium, and iron in fine-grained volcanic rock) flows of the Pleistocene Kate Peak Formation, which provided much of the material that presently fills the canyon. The site itself is relatively level to very gently rolling terrain with moderate relief. The site elevation is highest toward the south and gently slopes to the north toward the Truckee River. Relief in the surrounding area varies from very low in some of the intermountain basins to quite high in the adjacent mountain ranges. The average elevation at the site is approximately 1,295 meters (4,250 feet). Typical elevations of the nearby basins are between 1,219 and 1,829 meters (4,000 and 6,000 feet); elevations at the tops of bordering mountain blocks range between 1,829 meters and 2,438 meters (6,000 and 8,000 feet). The major structural elements in the general region surrounding the site are the Pah Rah Range to the north; the Virginia Range to the south; the Walker Lane Fault Zone to the northeast; and the Olinghouse Fault Zone, which trends east west along the southern flanks of the Pah Rah Range.

The Tracy Power Station project site is located in the western part of the Great Basin Tectonic Province. The site is located about 40.2 km (25 miles) from the adjacent Sierra Nevada Tectonic Province. This location, in a transition zone between two tectonic provinces, is one of the most seismically active (Seismic Zone 4) and complex regions of the United States.

Based on seismicity and style of faulting, the western Great Basin has been divided into three subprovinces (*Selmmons, 1980*): (1) the transition between the Sierra Nevada Frontal Fault Zone and the Walker Lane Fault Zone: (2) the Walker Lane Fault Zone: and (3) the Great Basin Zone east of Walker Lane Fault Zone. The Walker Lane Fault Zone is a 32.2-km (20 mile) wide, northwest trending zone of mainly right-lateral faults that extend from near Walker Lake northwest through Pyramid Lake and into the Modoc Plateau of California. North of Pyramid Lake, the faults tend to radiate more northward and the Walker Lane Fault Zone becomes wider and more diffuse overall. The Walker Lane faults south of Pyramid Lake are relatively quiet compared to the faults in the other sub provinces, although active faults are abundant in northeast California. The closest active fault to the site within the Walker Lane is the Pyramid Lake strand, which is approximately 22 km (15 miles) from the site. It has

an estimated Maximum Credible Earthquake value of 7.5. (A maximum credible earthquake, MCE, is the most serious earthquake that can be hypothesized from known geologic characteristics.)

East of the Walker Lane Fault Zone, faults are generally north-south trending normal faults. This part of the Great Basin has had several historic earthquakes of magnitude 6.6 to 7.7, including the 1954 Rainbow Mountain Fairview Peak, and Dixie Valley earthquakes. Epicenters along the Dixie Valley-Fairview Peak area continue south across the Walker Lake Fault Zone and intersect the Sierra Nevada Frontal Fault Zone. Forty-four earthquakes of magnitude greater than 5.0 have been reported in the area between 1852 and 1992.

The Truckee-Verdi-Reno-Olinghouse Transverse Fault Zone is of particular concern because it passes near the proposed site and includes the Olinghouse Fault Zone. The active portion of the Olinghouse Fault Zone extends from 16 km (10 miles) east of Reno along the north side of the Truckee River Canyon, passes through Olinghouse Canyon, and abruptly arcs to the northeast to terminate against a fault of the Walker Lane Fault Zone for a total length of 23 km (14 miles). In 1869, a series of earthquakes with magnitudes up to 6.7 occurred along this fault producing surface rupture north, west, and east of Tracy. This fault is located approximately 1.6 km (1 mile) from the proposed site at its closest approach; it has an estimated Maximum Credible Earthquake value of 7.1.

The largest historical seismic events close to the project site are the 1852 event with a possible magnitude of 7.0 and the three December 1869 earthquakes with estimated magnitudes of between 5.5 and 6.7. The 1852 earthquake was located just south of Tracy Station; however, the precise location of the earthquake has not been determined because information is based solely on descriptions by members of the Paiute Indian Tribe who were camping south of Pyramid Lake near Wadsworth. The epicenters of the 1869 earthquakes were located on the Olinghouse Fault Zone 16 to 39 km (10 to 24 miles) east of Reno. This zone is where the surface rupture occurred and includes the closest approach of the fault to the site.

The extent of wetlands is sufficiently limited to the extreme northern portion of the property and, siting new facilities has been done to avoid permanent wetland disturbance. A temporary fence was erected to restrict construction activities within the wetlands.

4.3 Environmental, Safety and Hazard Considerations

The Piñon Pine Project will comply with environmental, health, safety and socioeconomic (EHSS) statues and regulations. The probability of EHSS compliance is essentially assured. EHSS risks will be minimized. Health and safety plans were based on existing experience, and are referenced. Adverse environmental impacts will be at acceptable levels, and socioeconomic impacts will be beneficial. Mitigation measures identified in the Final Environmental Impact Statement (EIS) have been incorporated into the Record of Decision. All other midigation actions will be completed concurrent with plant construction.

EHSS compliance for the Piñon Pine Project is essentially assured because of the understanding of permit and regulatory requirements, and the adherence to safety regulations and codes.

Construction and operation of the Piñon Pine Project will be undertaken in a safe manner and in compliance with the general requirements of the Occupational Health and Safety Act (OSHA) PL 91-596, Part 1926 for construction and Part 1910 for operating.

Hazardous wastes will be handled in full compliance with OSHA Standard 29 CFR Part 1910.1200. These requirements relate to the Hazard Communication/Right-to-Know Program.

Presently there are no specific OSHA requirements in Nevada for the protection of workers in gasification plants. Guidelines for workers health and safety at coal gasification facilities have been recommended by the National Institute of Occupational Safety and Health (NIOSH) in:

- "Recommended Health and Safety Guidelines for Coal Gasification Pilot Plants", Department of Health, Education and Welfare (DHEW) (NIOSH) Publication No. 78-120, January 1978.

- "Criteria for Recommended Standard, Occupational Exposure in Coal Gasification Plants", DHEW (NIOSH) Publication No. 78-191, September 1978.

4.4 Supplied Utilities

4.4.1 Coal Supply

The gasifier is designed to operate with a wide variety of coals. For each coal property, there is a considerable range acceptable to the gasifier. The flexibility of fuel supply is a major advantage of this process. During the operation of the Piñon Pine Project the predominant fuel will be low sulfur coals from the western U.S., with high sulfur coals from areas such as Pennsylvania being used for demonstration tests. The western coals used will be sub-bituminous and bituminous coals such as those found in Utah, Colorado, Wyoming, and Montana.

Coal in these states is abundant. Supplies will not only be available for the life of this project, but will also be available into the future. Currently, coal in this region is in an oversupply situation that has driven market prices down to levels last seen in the 1960's. SPPCo's economic forecast for fuel prices projects that these coal prices will remain stable in the future, and will not increase at rates exceeding general inflation.

SPPCo has interviewed major coal producers in the area who are able to supply required quantities from existing facilities at attractive prices.

All deliveries will be made by railcar to the Tracy facility. There are facilities of the Southern Pacific Railroad currently on-site.

4.4.2 Limestone

Sorbent requirements for in-bed desulfurization have been evaluated for the life of the project. High quality limestone supplies suitable for project needs are available from several active producers in Nevada and western Utah. Although a variety of sorbents of various qualities are suitable for use as sorbents in the gasification process, optimum sulfur removal efficiency will be achieved with maximum concentration of calcium carbonate.

Project requirements are approximately 80 tons/day of 90% + calcium carbonate ($CaCO_3$) limestone. The material will be delivered to the site as limestone sand, 16 x 200 mesh, maintained dry so that no additional preparation is needed prior to injection into the gasifier. Dust-free truck transportation and storage will be incorporated.

4.4.3 Natural Gas

Start-up and emergency backup fuel will be provided by a 12" diameter pipeline, pressurized at nominal 500 psia utilized to provide natural gas to the combustion turbine. This line is on-site and connected to the Paiute gas transmission line at the plant boundary. The Paiute transmission line is the main line to the Reno area, and its transmission capacity will accommodate the requirements of the project except for brief periods during the winter when use of natural gas for electric power generation is curtailed. During these periods, propane will be utilized.

4.4.4 Electric Power

The plant is within SPPCo's service area. Construction power will be provided from existing buses, with electric power of 4.1 KV, approximately 100 feet from the project boundary.

4.4.5 Water Requirement and Availability

For the project, cooling water make-up will be taken from the existing cooling pond which is supplied from the Truckee River which adjoins the site, using an additional pump and existing water rights. Raw water for the demineralization train will be taken from existing deep wells. SPPCo serves water to 53,000 customers in northern Nevada and has extensive water management experience throughout the region. Sufficient water rights exist to provide the Tracy site with the required water for the gasification process, the steam cycle, the cooling water and the balance of the plant through the year 2030.

4.4.6 Transportation System

Both highway and rail transportation will be used during the construction and operation phases of the project. The property is adjacent to I-80, a four-lane interstate highway. The site is served by the main line of the Southern Pacific Railroad which runs through the property. An extended rail spur for coal transport will be provided. Air transportation is available through Reno Tahoe International Airport, a major airport located in Reno approximately 20 miles from the Tracy site.

4.4.7 Solid Waste Handling

Cooled solid waste consisting of ash, fines and sulfated limestone from the sulfation unit will be conveyed continuously to the solid waste storage silo.

The solid waste material in the silo will be loaded onto trucks by gravity during the day shift operation, 5 days per week. The silo will be equipped to minimize dusting during the truck loading operation. The solid waste will be hauled to the lined landfill located approximately 2,000 ft. southeast of the process area. A local landfill has expressed interest in using the material as cover.

The solid waste silo will be sized for three days of storage to handle the solid waste production over the weekend without the need of the truck load-out operation.

5.0 PLANT DESCRIPTION

The major systems of the Piñon Pine Project IGCC facility are described in this section of the report. Equipment List, Process Flow Diagrams, Plot Plans, and Heat and Material Balances are included in the Appendices.

5.1 Combined Cycle

5.1.1 Gas Turbine Generator (Area 700)

A General Electric Model MS6001FA Gas Turbine Engine (70.1 MW International Standards Origanization (ISO) rating) has been selected as the prime mover for the Piñon Pine Project. The engine's output shaft power will be reduced in rotative speed in a gearbox, from the optimum-efficiency value for a gas turbine of this size to 3600 Revolutions per minute (RPM). Mechanical power will then be converted to electrical power in a once-through air-cooled synchronous generator.

The gas turbine generator's, GT701, operating characteristics using syngas fuel at annual-average ambient air conditions (50°F, 12.56 psia, 20% relative humidity (RH)) are approximately as follows:

Output:	60,990 kilowatts (kW)[1]
Heat Input:	568.4 MMBtu/hr
Exhaust to heat recovery steam generator (HRSG):	flow: 1,422,000 lb/hr
	temp: 1,103°F

[1] = at the generator terminals, 0.85 power factor (pf)
[2] = chemical release, i.e. does not include syngas sensible heat

Available thermal energy in the exhaust gases will be captured in a heat recovery steam generator, SG801, (Section 800) to drive a condensing steam turbine generator.

The gas turbine will be an eighteen stage axial flow compressor with modulated inlet guide vanes. Interstage extraction will be used for turbine nozzle and wheelspace cooling. Because the blading material in the compressor will have high corrosion resistance, a coating will not be required. Approximately 20% of the total compressor discharge air will be extracted from the engine for the air-blown gasifier, and return as part of the syngas fuel.

The gas turbine engine will be provided with a conventional array of auxiliary systems and accessory devices, supplemented where necessary by special provisions for gasifier air extraction and combustion of syngas. Gas turbine auxiliary systems and accessory devices include:

- Load gear
- Synchronous generator
- Excitation system
- Control panel
- Fuel system
- Lubrication oil system
- Starting system
- Inlet air/evaporative cooler system
- Compressor cleaning system
- Fire protection system
- Noise abatement

5.1.2 Steam Turbine Generator and Heat Recovery Steam Generator (Area 800)

5.1.2.1 Heat Recovery Steam Generator

A heat recovery steam generator (HRSG), SG801, will be provided to recover the heat in the gas turbine exhaust gas stream. Two (2) levels of steam will be generated:

Level 1	1006.7 psia
Level 2	59.1 psia

Steam generated in the HRSG at 1006.7 psia, and high pressure steam generated in the gasifier island, will be combined, superheated in the HRSG and sent to the steam turbine generator at 950 psia, 950°F for expansion. The 59.1 psia steam generated will be superheated and sent at 55 psia, 360°F to the deaerator, DH801, for heating and stripping with the excess sent to the steam turbine generator, TG801.

The following items will be included in the HRSG:

Item No.	Description
D801	High Pressure Steam Drum

D802 Low Pressure Steam Drum
DS801 Main Steam Attemperator

5.1.2.2 Stack

The exhaust gasses exiting the steam generator and gasifier island will vent to the atmosphere via a 28' dia. x 225' high concrete shell stack.

The stack, ST801, will contain two (2) insulated steel flues; one (1) 13' dia. and one (1) 4' dia.

The 13' dia. flue will be dedicated to gas turbine exhaust while the remaining flue will be dedicated to the gasification plant. The stack shall be equipped with test ports, interior access, lighting, aviation warning lights and lightning protection.

5.1.2.3 Steam Turbine Generator

The steam turbine generator, TG801, will be a condensing type unit with extraction at nominally 485 psia providing steam, after pressure control and desuperheating to the gasifier at 420 psia, 700°F. High pressure steam letdown will be used if and when low throttle steam rates cause the extraction pressure to fall below that required to provide 420 psia steam. This letdown will provide steam for injection to the gas turbine generator at 420 psia, 700°F for NO_x control when operating on natural gas or propane fuel.

The steam turbine will exhaust into a surface condenser, E801. Cooling water from Section 1200 will condense the exhaust steam at 2 inches of mercury pressuge (in. Hg), based on normal gasifier load at 50 °F ambient temperature. Condensate will be pumped from the condenser by the hotwell condensate pumps, P801 A/B, through the condensate preheater in the HRSG for the recovery of low level heat and thence to the deaerator. Venting of the condenser will be accomplished by a vacuum pump system.

High pressure boiler feed water (BFW) will be pumped from the deaerator to the high pressure evaporator and Section 300, Gasification, and Section 600, Sulfation by the high pressure BFW pumps, P803 A/B. High pressure BFW to the high pressure evaporator will be preheated in an economizer section of the HRSG. Deaerated low pressure BFW will be pumped to the low pressure evaporator by the low pressure BFW pumps, P802 A/B. BFW to the low pressure evaporator will be preheated in an economizer section of the HRSG.

The steam turbine generator will have an output of 46,226 kW at a power factor of .85, 329,133 lb/hr throttle flow, 11,855 lb/hr extraction @ 485 psia, 15,304 lb/hr induction at 54 psia and 360°F and 2.0 inches of mercury absolute pressure (in.HgA) exhaust backpressure.

A deaerator, DH801, shall be supplied to deaerate returned condensate and demineralized water make-up.

In addition, the following equipment shall be provided in the steam generation system:

Item No.	Description
DS802	M.P. Steam Desuperheater
DS803	Pegging Steam Desuperheater
E802	Gland Condenser
P804A/B	Vacuum Pumps
D803	Continuous Blowdown Drum
D804	Intermittent Blowdown Drum

5.2 Gasifier Island

The gasifier island is based on utilizing a KRW air blown, fluidized-bed coal gasifier to produce a fuel gas for use by the combustion gas turbine which will utilize a low Btu fuel gas. During normal base load operation, the gasification system will:

1.	Produce:	285,000 lb/hr syngas with a heating value of 129 btu/scf
2.	Export:	156,000 lb/hr of steam for power production to the combined cycle area
3.	Consume:	880 TPD Raw Coal
		50 TPD Limestone
4.	Discharge:	120 TPD of LASH (limestone/ash mixture) for deposit to landfill

5.2.1 Coal Gasification (Area 300)

This area will contain the solids feed system and the gasifier with its associated cyclone. Solids feeds will consist of the coal to be gasified and limestone sorbent used for capture of sulfur compounds emitted during gasification.

Coal and limestone (as well as coke breeze during start-up) will be fed from a single conveyor to the atmospheric feed surge bin, BN301, which will be equipped with the feed surge bin vent filter, F302, to capture fugitive dust. This bin will periodically discharge solids into the feed pressurization hopper, BN302. After transfer of solids into BN302, it will be isolated from BN301 and pressurized with air from the air receiver, D301. Pressurization will be done through the hopper vent filter, F301, which back flows solids collected during the depressurization step back into BN302. After pressure equalization with the feed hopper, BN303, solids will be transferred from BN302 to BN303. When BN302 is empty, it will be isolated and depressurized to begin the next cycle. The feed hopper, BN303, will never be emptied.

The feed hopper, BN303, will provide a continuous feed of coal and limestone to the gasifier through the coal feeder, FD301. Solids from the feeder will be picked up by transport air from E204 and fed directly into the gasifier central feed tube. Additional air from the recuperator, E201, will be fed through the same feed tube and the streams merge to form a central jet where the coal will quickly devolatilize, with the remaining char and limestone entering the bed. Combustion of char and gas will occur within the jet to provide heat necessary for endothermic devolatilization, gasification and desulfurization chemical reactions. Extraction steam from the steam turbine will be fed to the gasifier bed. Steam will be

injected at the gasifier grid to aid in fluidization of the gasifier bed. The primary gasification and combustion reactions whichwill occur in the gasifier are:

$C + H_2O$	---->	$CO + H_2$	(carbon + water yields carbon monoxide + hydrogen)
$C + CO_2$	---->	$2CO$	(carbon + carbon dioxide yields carbon monoxide)
$CO + H_2O$	---->	$CO_2 + H_2$	(carbon monoxide + water yields carbon dioxide +.hydrogen)
$C + O_2$	---->	CO_2	(carbon + oxygen yields carbon dioxide)

Carbon monoxide and hydrogen will form the major combustible constituents of the product gas. Methane and other hydrocarbons will be produced in lesser quantities, primarily from the devolatilization process. The operating temperature of the gasifier will be sufficiently high to crack any tars or oils that might be produced.

Gasification will result in the release of sulfur from the coal, primarily in the form of hydrogen sulfide (H_2S). At gasifier operating conditions (nominal 295 psia and 1800°F gas exit), the limestone sorbent fed with the coal will quickly calcine and react with the H_2S according to the following reactions:

$CaCO_3$	---->	$CaO + CO_2$	(calcium carbonate yields calcium oxide + carbon dioxide)
$CaO + H_2S$	---->	$CaS + H_2O$	(calcium oxide + hydrogen sulfide yields calcium sulfice + water)

The amount of H_2S that will be captured is limited by chemical equilibrium. With the low sulfur Southern Utah Fuel Company (SUFCO) coal, approximately 50% of the sulfur released from the coal will be removed from the gas by reaction with CaO. Sulfur exiting the gasifier in gaseous form will be captured by the external desulfurizer system in Area 600.

The product gas which will exiting the top of the gasifier will contain a significant quantity of entrained solids, consisting of char (unconverted coal), ash, and sorbent. The gas will enter the gasifier cyclone, S301, which will remove most of the solids. Gas from the cyclone will be directed to the product gas cooler, E401, and the product gas trim cooler, E403, for heat recovery.

Solids collected in the gasifier cyclone, S301, will be returned to the gasifier via the dipleg. Recycle gas from the recycle gas compressor, C901, will be used to fluff the dipleg to facilitate flow of solids back to the gasifier bed. Recycle gas will be used to provide fluidization gas and for cooling of the spent solids in the annulus at the bottom of the gasifier.

As carbon in char is consumed, the particles will become enriched in ash. Ash particles tend to agglomerate, and along with dense calcium sulfide/oxide particles, separate from the char bed because of different density and fluidization characteristics. This separation will occur primarily in a region that surrounds the central feed tube at the bottom of the gasifier. These solids will be further cooled in the gasifier annulus by a counter current stream of recycle gas. The spent solids leaving the gasifier will be transferred via the ash feeder, FD302, to the ash collection hopper, BN501.

The gasifier and sulfator start-up heater, H301, will heat the gas turbine extraction air to 1000°F for preheating the gasifier and downstream equipment during start-up.

5.2.2 Oxidant Compression and Supply (Area 200)

This area will provide air to the gasifier, air for regeneration of the desulfurization sorbent, air for coal and limestone feed pressurization and transport air for feeding coal and limestone into the gasifier.

Air for the gasifier island will be extracted from the gas turbine's air compressor. A portion of this air will be diverted for use during startup of the gasifier. The major portion of the air, which will be the oxidant feed to the gasifier, will have to be compressed above gasifier operating pressure. To minimize power consumption during compression, this air will be cooled to 120°F in three exchangers in series. E201 will be the air recuperator which reheats the gasifier air after compression. Further cooling will be done in the air precooler, E203, which will heat BFW, and the trim cooler, E202, which will use cooling water for the final gas cooling. The knockout drum, D201, will be provided downstream of the trim cooler to remove any water condensed from air during cooling. Any water collected will be sent to the waste water treatment system.

Air exiting the knockout drum will be compressed by the boost air compressor, C201, to above gasifier pressure level. A portion of this air will be cooled by cooling water in the transport air cooler, E204, and is split into two streams. One of the streams is used as transport air to feed solids into the gasifier. The other stream will be diverted to the suction of the pressurization air compressor, C301. The major portion of the air exiting the boost air compressor, C201, will be reheated in the air recuperator, E201, and again divided into two streams. A major portion of this stream will be fed to the gasifier while the other portion will be used for regeneration of the zinc oxide based desulfurization sorbent.

A portion of air exiting the transport air cooler will be compressed to about 600 psia by C301 and sent to the pressurization air receiver, D301, which will dampen out compressor fluctuations and serve as a surge vessel. Air from D301 will be used directly for coal/limestone feed pressurization.

5.2.3 Gas Stream Heat Recovery (Area 400)

This area will include cooling of the main product gas from the gasifier as well as cooling of the recycle gas.

Product gas from the gasifier cyclone, S301, will be cooled to about 1000°F in the product gas cooler, E401, and the product gas trim cooler, E403. The rejected heat will generate steam from BFW supplied from the steam drum, SG401. Circulation through these two exchangers will be by natural convection.

The particulate free, desulfurized product gas exiting the hot gas filter, F501, is cooled in the recycle gas cooler, E402 by high pressure BFW. A portion of the cooled gas will be used for solids transport in the sulfator system. The major quantity will be sent to Area 900 (recycle gas compression) for further treatment.

The gasifier steam drum, SG401, will operate at 1075 psia (nominal) and will be supplied by BFW from Area 800. Steam from the gasifier steam drum will be combined with superheated steam from the HRSG steam drum, D602, and passed through the superheater section of the HRSG, SG602, in order to superheat it to 600°F prior to delivery to Area 800. Blowdown from the gasifier steam drum will be combined with blowdown from the HRSG steam drum and also returned to Area 800.

The high pressure BFW at 230°F from Area 800 will be split into several streams. A portion will be sent directly to the air precooler, E203, and the recycle gas cooler, E402. Heated BFW exiting these exchangers will be routed to the gasifier steam drum. The remaining BFW from Area 800 will flow directly into the gasifier steam drum, SG401, and the HRSG steam drum, D602. Some BFW from SG401 will flow to the regenerator effluent gas cooler, E607. The mixture of BFW and steam exiting E607 will flow back to SG401. BFW entering the sulfator steam drum will be preheated in the economizer section of SG602.

5.2.4 Gas Stream Particulate Removal (Area 500)

This area will provide final cleanup of particulates in the product gas stream and collection of all spent solids prior to final processing.

Desulfurized product gas from the desulfurization section will contains a small quantity of particulates. This stream will be sent to the hot gas filter, F501, which essentially removes all of the remaining particulates. The hot gas filter will be a ceramic candle type utilizing back pulse gas for cleaning. Candle elements used for filtration will be housed in a steel vessel with access capability for replacement of candles. The particulate free desulfurized gas exits the filter and will be sent to the gas turbine.

Blowback gas for cleaning of the filter elements will be provided from the recycle gas receiver, D901. Fines removed by the filter elements will be collected in the bottom of the filter vessel and discharged through the filter fines screw cooler, E501, which will cool the fines prior to discharging them into the filter fines collection hopper, BN503. Cooling will be accomplished in E501 by a closed heat transfer fluid system, PG501, which will be cooled by cooling water. The collected fines will be sent to the filter fines collection hopper, BN503, for further processing.

Hoppers BN501/502/508 and BN503/504/507 will be parallel systems for collection of feed ash and filter fines, respectively. Ash collected in BN501 will be ischarged into the ash depressurization hopper, BN502, which will be pressurized with high pressure recycle gas from the recycle gas receiver, D901. Pressurization will be done through the ash vent filter, F502, which will serve as a particulate filter during the depressurization cycle. Ash from BN502 will be discharged into the ash feed hopper, BN508, from where will be continuously transported to the sulfator by cooled recycle gas stream. The fines collection and feed system will be operated in a similar manner utilizing the filter fines collection hopper, BN503, filter fines depressurization hopper, BN504, filter fines feed hopper, BN507, and the filter fines vent filter, F503. Filter fines from BN507 will be conveyed by a stream of recycle gas to the fines combustor, H602. Vent gas from the ash depressurization hopper and the filter fines depressurization hopper will be routed to the sulfator.

5.2.5 Desulfurization (Area 600)

This area will desulfurize the product fuel gas prior to delivery to the hot gas filter, FG501, and condition the solids waste for disposal.

· Desulfurization (Fuel Gas):

Fuel gas from E403 will be fed to the fuel gas desulfurization system at approximately 1000°F. Sulfur compounds will be removed from the gas by a zinc oxide based sorbent, which will contain nickel oxide, according to the following reactions:

$ZnO + H_2S$ ----> $ZnS + H_2O$ (zinc oxide + hydrogen sulfide yields zinc sulfide + water)
$ZnO + COS$ ----> $ZnS + CO_2$ (zinc oxide + carbonyl sulfide yields zinc sulfide + carbon dioxide)
$NiO + H_2S$ ----> $NiS + H_2O$ (nickel oxide + hydrogen sulfide yields nickel sulfide + water)
$NiO + COS$ ----> $NiS + CO_2$ (nickel oxide + carbonyl sulfide yields nickel sulfide + carbon dioxide)

The sulfur compounds in the product gas to the gas turbine will be reduced to less than 20 parts per million by volume (ppmv) and the mildly exothermic absorption reactions will result in a small increase in the fuel gas temperature.

The fuel gas desulfurization system will comprise a transport desulfurizer, R603, and a transport regenerator, R604. The fuel gas from E403 will be fed to the mixing zone at the bottom of the riser of R603 where it will mixe with zinc oxide based sorbent from the desulfurizer cyclone, S603, that will be recirculated to the riser via the standpipe. Absorption of gaseous sulfur compounds will take place in the narrower riser section as the fuel gas and sorbent flow upward and into S603.

The sorbent leaving the riser of R603 will be partially sulfided. Bulk separation of the gas and solid phases will take place in S603. The solids separated in S603 will be collected in the standpipe from where a portion of the sulfided sorbent will be transferred to the regenerator riser and the remainder will be recirculated to the reactor. The fuel gas leaving S603 will be desulfurized and flow to the hot gas filter, F501, where it will undergoe final particulate (fines escaping the gasifier cyclone and attrited sorbent) removal before being fed to the gas turbine.

Fresh sorbent from bulk storage will be dumped into the sorbent storage hopper, BN603, pressurized in the sorbent feed hopper, BN604, and fed to R603 via the standpipe to maintain sorbent inventory and reactivity. Sorbent fines escaping BN603 and BN604 will be collected in the sorbent storage hopper vent filter, F604, and the sorbent pressurization hopper vent filter, F605, respectively.

The stream of sulfided sorbent withdrawn from the standpipe will flow to the mixing zone at the bottom of the transport regenerator, R604. Regeneration air from E201will be preheated in the sorbent regeneration air heater, H608, and will be fed to the mixing zone of R604. The sulfided sorbent will be regenerated by air according to the following highly exothermic reactions as both the sorbent and air flow up the regenerator riser:

$2ZnS + 3O_2$ ----> $2ZnO + 2SO_2$ (zinc sulfide + oxygen yields zinc oxide + sulfur dioxide)
$2NiS + 3O_2$ ----> $2NiO + 2SO_2$ (nickel sulfide + olygen yields nickel oxide + sulfur dioxide)

The temperature of the gas exiting the regenerator riser will be approximately 1200°F and will be controlled by varying the inlet temperature of the regeneration air, the circulation rate and sulfur loading of the sulfided solids. The mixture of regenerated sorbent and gaseous products of regeneration leaving the riser will enter the regenerator cyclone, S604, where bulk separation of the solids and gaseous phases occur. The regenerated sorbent will be returned to the standpipe of R603. The SO_2-rich gas from regeneration will be cooled in the regenerator effluent cooler, E607, and then routed to the sulfator, R602, for SO_2 capture.

Sorbent withdrawal from the fuel gas regeneration system, if required, will normally be from the bottom of S604. However, at times when emergency dumping of solids is required, solids may also be drawn from the solids return leg on R603 standpipe or from the bottom of R603 mixing zone. The solids will be stored in the spent sorbent hopper, BN605, and will then be sent either to disposal or returned to BN603. BN605 will be provided with the sorbent depressurization hopper vent filter, F606, to capture any sorbent fines.

- Waste Solids Treatment:

With the exception of a small quantity of sulfur in the fuel gas to the gas turbine, all of the sulfur in coal will ultimately be disposed of in the sulfator system. This system will serve the following functions:

1. Combustion of residual char in the ash and fines collected from gasification.
2. Capture of SO_2 from both the residual char combustion and the desulfurizer regeneration effluent gas.
3. Oxidation of calcium sulfide (CaS) produced in the gasifier to calcium sulfate.

The sulfur reactions which will occur in the sulfator can be represented by the following equations:

$S + O_2$ ----> SO_2 (sulfur + oxygen yields sulfur dioxide)
$CaO + SO_2 + 1/2\ O_2$ ----> $CaSO_4$ (calcium oxide + sulfur dioxide + olygen yields calcium sulfate)
$CaS + 2O_2$ ----> $CaSO_4$ (calcium sulfide + olygen yields calcium sulfate)

All of these reactions are highly exothermic and may not proceed to completion. In addition, a small recycle gas stream (transport and pressurization gas) will be combusted in the sulfator.

The sulfator, R602, will be a bubbling bed reactor which will be fluidized by air supplied by the sulfator air compressor, C601. Solids exiting gasifier bottom which contain unconverted calcined limestone, sulfided limestone and ash (LASH) will be conveyed from the ash feed hopper, BN508, to the sulfator with cooled recycle gas from the recycle gas cooler, E402. Regeneration effluent gas from the desulfurization system will be fed to the sulfator for capture of SO_2 by reaction with the unconverted calcined limestone in the solids from the gasifier. Provision will be made to add additional fresh limestone, from the limestone feed hopper, BN505.

Instrument air will be used to pressurize BN505 to add fresh limestone to the sulfator during normal operation. Any fugitive dust from BN505 will be captured by the limestone feed hopper vent filter, F504. During the start-up, air from C601 will be preheated in the gasifier and sulfator start-up heater, H301, and passed through the sulfator and downstream equipment.

The sulfator will be operated at essentially atmospheric pressure. In order to maximize SO_2 capture and sulfide oxidation, the sulfator temperature will be maintained at about 1600°F. This will be done by generating saturated steam in the primary solids cooler, E605, which will be supplied with BFW from the HRSG steam drum, D602, by natural convection. Steam generated in E605 will be collected in D602.

Filter fines from BN507 will be conveyed by a stream of recycle gas to the fines combustor, H602, to burn off carbon for additional heat recovery. Air for combustion temperature control will be supplied by C601.

Flue gas leaving the sulfator will pass through the sulfator cyclone, S601, for removal of particulates and will then be mixed with flue gas from H602 prior to cooling in the HRSG, SG602, to about 300°F. The gas will then pass through the sulfator flue gas bag house filter, F602, for final removal of particulates and will be sent to the stack.

Gas cooling in SG602 will be acheived by generating steam at 1075 psia and preheating BFW, respectively. Additional saturated steam will be generated in HRSG coils with BFW supplied from D602 by natural circulation. Deaerated BFW from Area 800 will be heated in the economizer section of SG602 prior to transfer to D602.

Saturated steam generated in HRSG and solids coolers will be collected in D602, mixed with steam from SG401 and passed through the superheater section of SG602 to superheat to 600°F (approximately 50°F superheat at battery limit pressure of 1025 psia) prior to exporting it to Area 800.

Solids leaving the bottom of the sulfator will be cooled in the sulfator solids screw cooler, E602, and collected in the sulfator solids collection hopper, BN601. These will then be combined with solids collected in the sulfator flue gas bag house filter, F602, in the sulfator solids depressurization hopper, BN602, which will be pressurized by instrument air and collect solids from BN601. Solids from BN602 will be discharged on to a conveyor for transfer to Area 1100.

5.2.6 Recycle Gas Compression (Area 900)

This area will provide for recompression and distribution of recycle gas to various users.

Recycle gas from the recycle gas cooler, E402, will be split into three streams. A portion will be sent directly to the sulfator system for use as transport gas. A second stream will be compressed by the recycle gas compressor, C901, to gasifier pressure for recycle directly to the gasifier and for use as fluffing gas in the desulfurizer riser.

A third stream will be further cooled in the recycle gas booster compressor trim cooler, E901, to 120°F before compression. Cooling will result in condensation of a small amount of water from gas which will be removed in the recycle gas knockout drum, D902, and disposed to the sulfator. The cooled gas from D902 will be fed to the recycle gas booster compressor C902 which will boost the pressure to about 1750 psia. The high pressure gas will be sent to the recycle gas receiver, D901, which will act as a surge vessel. Gas from D901 will be used as blowback gas to clean the gas filter, F501, and also for pressurization of the ash depressurization hopper, BN502, and the filter fines depressurization hopper BN504. A small amount of this gas will be used for fluidization of the transport desulfurizer standpipe.

5.3 Offsites

5.3.1 Solids Receiving and Grinding (Area 100)

5.3.1.1 Raw Coal Receiving and Storage

Raw coal, size 2" x 0, will be received at the plant from a unit train consisting of up to eighty-four 100-ton railcars every seven days. The coal will be received at the unloading station and transferred to the coal storage dome. The unloading station will be enclosed and provided with a dust collection system to avoid uncontrolled coal dust emissions. The unloading station will consist of two receiving hoppers, each equipped with belt type unloading feeder which will feed the raw coal to the raw coal transfer conveyor. Coal will be weighed in transit by the raw coal receiving scale located at the tunnel exit of the raw coal transfer conveyor. A sweep type automatic sampling system will be installed on the coal transfer conveyor, and located after the conveyor tunnel exit, to collect a representative raw coal sample to determine the quality of coal received. The raw coal unloading and conveyor system will be sized to handle an 84 railcar train unloading operation in a four-hour period, at a design rate of 2,250 std. tons/hr. The raw coal receiving system will consist of the following major components:

Item No.	Description	Duty
BN101A/B	Raw Coal Receiving Hoppers	100 std. tons each
FD101A/B	Raw Coal Receiving Feeders	1,125 std. tons/hr each
CR102	Raw Coal Transfer Conveyor	2,250 std. tons/hr
WS101	Raw Coal Receiving Scale	2,250 std. tons/hr
F106	Coal Receiving Dust Filter	58,800 ACFM*
B105	Coal Receiving Exhaust Fan	58,800 ACFM*
CR111	Filter Discharge Conveyor	4.3 std. tons/hr
FD111	Receiving Filter Airlock Feeder	4.3 std. tons/hr
PG103	Sampling System consisting of:	2,250 std. tons/hr
	CR116 Sample Rejects Bucket Elevator	
	FD116 Primary Sample Feeder	
	FD118 Secondary Sample Feeder	
	SR103 Primary Sample Crusher	
	SS103 Primary Sampler	
	SS104 Secondary Sampler	

P101A/B	Sump Pump	100 GPM

*Actual Cubic Feet per Minute

The coal will be stored in a 250' diameter field erected storage dome which will be sized to store 16,400 std. tons of coal, or approximately a twenty day supply. No exposed storage of coal, such as a coal pile, is planned, thus all coal storage will be within the dome. The material in the coal storage dome will be stockpiled and reclaimed by an automated circular coal pile stacker/reclaimer assembly. The raw coal will be discharged through a vibratory feeder onto the raw coal collecting conveyor. This conveyor will transfer the coal to the crushing station for sizing and screening. In the event of an emergency, provisions will be made to discharge the stockpile through an emergency reclaim hopper equipped with a feeder into the raw coal collecting conveyor. The coal storage system will consist of the following major components:

Item No.	Description	Duty
X100	Coal Storage Dome	16,400 std. tons
CR105	Raw Coal Collecting Conveyor	340 std. tons/hr
SE101	Raw Coal Magnetic Separator	340 std. tons/hr design
F107A/B/C	Raw Coal Storage Dust Filters	2,500 ACFM (each)
B106A/B/C	Raw Coal Storage Exhaust Fans	2,500 ACFM (each)
PG102	Stacker Reclaimer Package consisting of:	
	CR118 Stacking Conveyor	2,250 std. tons/hr
	RL101 Coal Pile Reclaimer	110 std. tons/hr normal 340 std. tons/hr max.
FD114A/B	Coal Pile Discharge Feeders	110 std. tons/hr normal 340 std. tons/hr max.
BN108	Emergency Reclaim Hopper	
P103A/B	Reclaim Tunnel Sump Pump	50 GPM

5.3.1.2 Coal Crushing and Screening

In coal crushing and screening, the raw coal will pass through a magnetic separator to remove tramp iron and will then be screened through a dual deck vibrating screen, which will control the product gasifier feed size of ¼" x 0 through the ¼" square holes of the lower deck of the vibrating screen. The oversize material from the upper deck will be fed to the coal crusher to bring the material size from 2" x 0 to the required ¼" x 0. This sized product will be recycled to the dual deck coal screen through flexible wall elevating conveyors. The ¼" x 0 product-size material will be transported into the coal storage silo utilizing an elevating flexible wall conveyor. The coal silo will be sized for 24-hour feed to the gasifier and will be filled daily through an 8-hour period operation of the crusher and the elevating conveyor.

A common single gasifier feed elevating conveying equipment system will be provided from the coal and/or start-up coke and the limestone silos to the gasifier area. The conveying system will consist of a weigh belt feeder from each silo and the common elevating conveyor. The system will be operating continuously during feeding of the gasifier. As with the raw coal handling system, care will be taken to

control any dust emission sources by means of dust collection system. The coal crushing and screening system will consist of the following major components:

Item No.	Description	Duty
B111	Crushing Station Dust Filter Fan	19,750 ACFM
FD115	Crushing Station Dust Filter Feeder	2.0 std. tons/hr
CR114	Oversize Coal Elevator	125 std. tons/hr
CR115	Sized Coal Conveyor	50 std. tons/hr
F109	Crushing Station Dust Filter	19,750 ACFM
SE104	Coal Screen	235 std. tons/hr
SR102	Coal Crusher	125 std. tons/hr
FD117	Oversize Coal Feeder	125 std. tons/hr
BN109	Emergency Surge Hopper	20 std. tons/hr
CR117	Emergency By-pass Conveyor	340 std. tons/hr
DV105	Coal Dust By-pass Diverter	340 std. tons/hr
DV106	Coal Dust By-pass Diverter	2.0 std. tons/hr

5.3.1.3 Coal, Coke and Limestone Feeding

Dried coke breeze, ¼" x 0, will be received in the plant via trucks with pneumatic trailers for initial plant start-up and for each subsequent gasifier start-up. The sized coke will be transferred from the trucks pneumatically to an 800-ton capacity coke storage silo using the truck-trailer's own pneumatic blower. Exhaust air from the filling operation will be vented through a dust control filter installed atop the coke silo. The material from the coke silo will be conveyed to the gasifier utilizing the common coal/coke/limestone elevating conveyor. The coke silo will be equipped with a constant speed weigh feeder provided with a feed depth regulating valve to feed the required coke to the common elevating conveyors.

Sized limestone will be received at the job site, on a daily basis, via trucks with pneumatic trailers. The sized limestone will be conveyed pneumatically to a 300 ton (5-day) capacity limestone storage silo using the truck trailer pneumatic blower. Exhaust air from this filling operation will be vented through a dust control filter installed atop the limestone silo. The material from the limestone silo will then be fed at a controlled rate by a variable speed weigh feeder and blended with the coal on the same elevating conveying line feeding the gasifier. Provisions will be included to transport limestone to the sulfator limestone feed hopper by pneumatic conveying. The material will be discharged from the limestone silo and distributed to the two conveying lines utilizing a bifurcated feed line. The pneumatic conveying line to the sulfator will be provided with the required conveying air blower and a stand-by air blower. The coal, coke and limestone feeding system will consist of the following major components:

Item No.	Description	Duty
BN105	Sized Coal Silo	818 std. tons
BV102	Coal Silo Bin Discharger	15-50 std. tons/hr
FD106	Coal Silo Discharge Feeder	15-50 std. tons/hr
F102	Coal Silo Exhaust Filter	2,500 CFM*

F105	Gasifier Feed Dust Filter	3,700 ACFM
B104	Gasifier Feed Dust Collection Fan	3,700 ACFM
BN106	Coke Silo	800 std. tons
BV103	Coke Bin Discharger	15-50 std. tons/hr
FD107	Coke Silo Discharge Feeder	15-50 std. tons/hr
F103	Coke Silo Exhaust Filter	1,250 CFM*
BN107	Limestone Silo	300 std. tons
BV104	Limestone Bin Discharger	1.5-5.0 std. tons/hr
B112	Coal Silo Fan	2,500 ACFM
F104	Limestone Silo Exhaust Filter	1,250 ACFM
FD108	Limestone Silo Discharge Feeder	1.5-5.0 std. tons/hr
B110A/B	Limestone Transport Blower	4 std. tons/hr
CR110	Gasifier Feed Elevating Conveyor	50 std. tons/hr
SE102	Gasifier Feed Magnetic Separator	50 std. tons/hr
WS102	Truck Scale	100 std. tons
D104	Limestone Transporter	4 std. tons/hr

*Cubic Feet per Minute

5.3.1.4 Dust Collection System

Dust collection systems will be provided in the plant for proper environmental control. Fabric filter collectors will be used to control fugitive dust emissions from the transport and transfer of coal, coke and limestone.

All material handling systems will be enclosed and supplied with dust collection systems for environmental control, with special attention being paid to dust generating areas mainly transfer points.

5.3.2 Solid Waste Handling (Area 1100)

Cooled solid waste consisting of ash, fines and sulfated limestone (LASH) from the sulfation unit will be conveyed continuously to the solid waste storage silo using a pneumatic conveying system. The air displaced from the silo will be vented through the bin filter, installed atop the solid waste silo.

The LASH in the silo will be loaded onto trucks during the day shift operation, 5 days per week. The silo will be equipped with a bin discharger, discharge valve and a telescopic loading chute with a bag filter and fan to minimize dusting during the truck loading operation. The LASH will be then hauled to the final disposal point. A local landfill has expressed interest in using the material as a cover, and other usages are being investigated.

The solid waste silo will be sized for three days of storage (400 tons) to handle the solid waste production over the weekend without the need of the truck load-out operation. The solid waste handling system will consist of the following major components:

Item No.	Description		Duty
BN1101	Solid Waste Bin		400 std. tons
BV1101	Solid Waste Discharger		100 std. tons/hr
PG1101	Sold Waste Load-Out package consisting of:		
	B1102	Load-Out Exhaust Fan	1,000 SCFM*
	CH1101	Solid Waste Loading Chute	100 std. tons/hr
	F1102	Solid Waste Load-Out Filter	1,000 SCFM*
	XV1101	Cut-off Gate	100 std. tons/hr
	B1103A/B	Pneumatic Transport Blowers	5 std. tons/hr
	D1101	Solid Waste Transporter	7,000 lbs/hr
	D1102	Ash Transporter	3,000 lbs/hr
F1101	Silo Vent Filter		2,500 CFM

*Standard Cubic Feet per Minute

5.3.3 Balance of Plant (Area 1200)

5.3.3.1 Raw Water System

The raw water system will provide water to the demineralization package, PG1201, which in turn will provide BFW makeup to the deaerator, DH801. Additionally the raw water system will provide water for the plant utility water system for miscellaneous users such as service wash stations. Well water from Well No. 4 will be the source of water for the plant raw water system. Well water will be pumped to the existing Unit 3 raw water tank and then pumped by the raw water pumps, P1202A/B, to the plant raw water system. Pumps P1202A/B will be designed to draw water from either the existing tank or directly fromWell No. 4.

Potable water for safety showers and eyewashes will be provided by the existing plant system. Drinking water will be provided as a brought-in bottled source.

5.3.3.2 Boiler Feedwater Supply and Storage

Makeup BFW will be demineralized by a package, PG1201, consisting of cation, degasification, anion and mixed bed units. Additionally, there will be storage and feeding of regenerating caustic and sulfuric acid, and appropriate local controls, including neutralization controls. Spare acid and caustic pumps and the neutralization air mixing system will also be included.

Regeneration waste will be stored in a neutralization tank, TK1202, where the waste will be mixed and neutralized before being sent to the dirty water sewer. Acid and caustic pumps will be provided for neutralization.

Demineralized water will be stored in TK1201 and pumped to the condensate system by the demineralized water pumps, P1208 A/B/C.

This system will produce demineralized water from raw well water for BFW make-up at a rate of 280 GPM. The demineralization system will consist of the following major components:

Item No.	Description
D1203A/B	Cation Units
T1201	Degasifier
D1204A/B	Anion Units
D1211A/B	Mixed Bed Units
P1203A/B	Acid Regeneration Pumps
P1204A/B	Caustic Regeneration Pumps
P1205A/B	Acid Neutralization Pumps
P1206A/B	Caustic Neutralization Pumps
P1217A/B	Booster Pumps
B1202A/B	Degasifier Blowers
E1201	Caustic Water Heater
D1201	Acid Storage Drum (8' - 0" dia. x 10' - 0" T-T)
D1202	Caustic Storage Drum (8' - 0" dia. x 13' - 0" T-T)
TK1201	Demineralized Water Tank (12' - 0" dia. x 32' - 0" high)
P1208A-C	Demineralized Water Pumps
TK1202	Neutralization Tank (12' - 0" dia. x 32' - 0" high)

5.3.3.3 Boiler Water Treatment System

A package of chemical dosing equipment will be provided for the conditioning of the boiler water. The boiler water treatment system will consist of the following major components:

Item No.	Description
TK1203	Phosphate Tank
M1201	Phosphate Mixer
P1211A/B	H.P. Phosphate Pumps
P1211C	Spare Phosphate Pump
P1212A/B	L.P. Phosphate Pumps
P1210A/B	Oxygen Scavenging Pump
P1213A/B	Amine Pump

5.3.3.4 Cooling Water System

The cooling pond will provide makeup water for the cooling tower, CT1201. Pond water will be pumped from the existing pond water pump structure to the cooling tower basin by the make-up pump, P1201.

A conventional induced-draft 3-cell counter-flow cooling tower, CT1201, will be used for the plant cooling water system. The top of the basin is 3' - 6' above grade. Cooling water will be circulated

through cells 1 and 2 by the vertical turbine cooling water pumps, P1211 A/B/C, and through cell 3 by pumps P1220A/B through the use of a split basin. (See Waste Water System Section 1000.)

The cooling tower will be designed for the 2½% occurrence condition of a 61°F wet bulb temperature and provide 80.5°F cooling water at that condition. Blowdown from cell 3 will be sent to the waste water treatment system.

Biocide injection will be provided by a biocide feeder. Other additives, corrosion inhibitors, pH controlling, biocides, and scale/deposit inhibitors, will be injected into the cooling water by the water treatment injection system. The cooling water system will consist of the following major components:

Item No.	Description
CT1201	Cooling Tower
P1209A-C	Cooling Water Pumps (cells 1 & 2)
D1208	Inhibitor Tank
D1209	Acid Tank
P1214A/B	Inhibitor Pumps
P1215A/B	Acid Pumps
FD1201	Biocide Feeder
P1220A/B	Circulating Water Pumps (cell 3)

5.3.3.5 Instrument and Plant Air System

A conventional plant and instrument air compression system will be provided. Two air compressors, one operating, one spare, will be provided for the system. A single air receiver will provide adequate surge capacity. The air will be dried to a -40°F dewpoint using an air drying desiccant system prior to branching off to plant and instrument air headers.

The following equipment will be provided to supply both Instrument and Plant Air:

Item No.	Description
C1201A/B	Compressors
D1207	Air Receiver
DR1201A/B	Air Dryers

5.3.3.6 Flare System

A flare system will be provided to incinerate the full product gas flow from the gasifier in the event of a power plant outage, gasifier start-up, or other emergencies. The flare, FL1201, will be a vertical free-standing system. Pilots will be designed to use natural gas or propane.

A 48" dia. x 60' - 0" flare stack with a capacity of 290,498 lbs/hr will be provided.

5.3.3.7 Nitrogen System

Nitrogen will be required for maintaining a constant flow of purge gas through selected equipment and instruments, blow-back cleaning of the hot gas filter (when normal process gas is unavailable), pneumatic conveying of coal dust and system purging at shutdown.

The Nitrogen Package, PG1205, will be a cryogenic air separation plant wherein the constituents of air will be separated by cryogenic distillation delivering high purity nitrogen (99.7%) in the required quantity.

Components of the package will include compressors, storage tanks, a liquid nitrogen pump and vaporizers sized to provide for start-up, normal operation and a safe shutdown of the facility.

5.3.3.8 Propane System

Propane will be the tertiary fuel to the combustion gas turbine. Liquid propane will be delivered by tank truck or tank car and stored in two 100,000 gallon (nominal) storage drums. The drums will be oriented, and earthen berms constructed, to minimize damage in the event of tank failure. Storage will be in accordance with the applicable National Fire Prevention Association (NFPA) requirements. When required, liquid propane will be drawn off the storage drums and pumped to the vaporizer prior to combustion as fuel in the combustion gas turbine. The propane system will consist of the following major components:

Item No.	Description
D1205	Propane Storage Drum
D1206	Propane Storage Drum
P1216A/B	Vaporizer Feed Pumps
E1202	Vaporizer

5.3.4 Waste Water Treatment (Area 1000)

Wastewater from the demineralization system and the blowdown from cells 1 and 2 of the cooling tower will be sent to the wastewater treatment system.

This system will soften and clarify these wastes and forward the treated water to the cooling tower cell 3 as make-up.

The sludge generated in the clarifier will be thickened and dewatered. The supernatant (surface) water from these processes is recycled within the waste treatment system.

Blowdown from cell 3 of the cooling tower will be discharged to an evaporation pond.

The pond will be double lined, and the system will be designed to meet the requirements of the Nevada Division of Environmental Protection (NDEP). The pond surface area (approx. 4 acres) is minimized by the use of eleven (11) floating water spray units, SX1001A-K. These will be located across the pond surface, each equipped with its own electric drive system. Water will be pumped up through each unit and sprayed across the pond surface improving the evaporation rate. The wastewater will not pose any adverse effect on wildlife such as migrating water fowl. Monofilament line with 25' spacing, which is unobtrusive to the human observer, has been used by SPPCo to successfully discourage migrating water fowl from landing in several of SPPCo's facilities.

The system will consist of the following items:

Item No.	Description
CL1001	Reactor Clarifier
CL1002	Thickener
D1001	Caustic Drum
F1001	Plate Filter Press
FR1001	Soda Ash Feeder
P1001A/B	Dirty Waste Water Pumps
P1002A/B	Clean Waste Water Pumps
P1003A/B	Clarifier Effluent Pumps
P1004A/B	Clarifier Blowdown Pumps
P1005A/B	Sludge Sump Pumps
P1006A/B	Thickener Sludge Pumps
P1007A/B	Caustic Pumps
P1008A/B	Soda Ash Pumps
P1009A/B	Magnesium Chloride Pumps
SX1000A-K	Spray Modules
TK1001	Clarifier Effluent Aging Tank
TK1002	Magnesium Chloride Tank
TK1003	Soda Ash Tank

5.4 Electrical Distribution

The existing Tracy sub-station is supplied at 120 KV by SPPCo. Connection to this system will be through tie and service breakers feeding unit transformers connected to the gas and steam turbrbine generators. The generators will be rated at 13.8 KV with maximum generator output equal to elevated temperature and/or auxiliary cooling transformer rating as required. The auxiliary power will be fed from each generator transformer servicing large motors 250 hp and over at 4.16 KV and 480 V for general distribution. The 4.16 KV and 480 V will be distributed radially. A second feeder from an existing 4.16KV transformer will permit alternate service in the event of maintenance turnarounds or equipment outages. However, this transformer will not be able to carry the coal gasification process in addition to the generator auxiliaries.

Metering will be on the 120 KV system for assessment. Additional metering will be furnished for gasifier, steam plant, material handling and auxiliary services. Protection will be arranged as required to coordinate with the SPPCo system and internal users.

Auxiliary systems within the plant will be serviced by Uninterruptible Power Supply (UPS) or batteries to support personnel safety and critical equipment during shutdowns or power outages.

5.5 Instrumentation

5.5.1 Digital Control System (DCS)

Plant process and supervisory control shall be performed with a DCS "Process Manager" type redundant processor located in the main control building. DCS Input/Output (I/O) cabinetry will be mounted close to the entry point of the field wiring into the control room. The cabinetry will contain the I/O terminals, I/O processing equipment, the controller files for the DCS, and all interconnecting vendor prefabricated cables. Redundant DCS network cables interconnecting the equipment mounted in the I/O cabinetry and the DCS operator's consoles will be vendor prefabricated "coax" cables. Gasifier island signals will be interfaced with the DCS operators console via a remote I/O unit located in the Gasifier Remote Instrument Enclosure (RIE) (see Section 3.5.5). The DCS will comprise equipment, hardware, and software of one single manufacturer, and be "equal" in functionality, quality, and proven operability, to the TDC-3000 LCN, UCN, and Process Manager product line as manufactured by Honeywell, Inc., Phoenix Arizona.

5.5.2 Continuous Emission Monitoring System (CEMS)

Two (2) CEMS shall be provided for monitoring of SO_2, NOx, O_2, opacity and flow. The systems shall be housed in an enclosure with Heating, Ventilation, Air Conditioning (HVAC) and sampling systems. A Data Acquisition System (DAS) shall be provided with the PC located in an analyzer house. The systems shall be certified by the system vendor's subcontractor to be in compliance with all federal and state requirements.

5.5.3 Water Analysis

A panel shall be provided with analyzers to analyze/monitor the following water constituents:

a. Dissolved Oxygen (DO) - qty (2)
b. Oxygen Scavenger - qty (1)
c. Sodium - qty (2)
d. Ammonia - qty (2)
e. pH - qty (4)
f. Silicates (S_1O_2) - qty (2)
g. Conductivity - qty (4)
h. Hydrogen - qty (1)

The above analyzers shall be mounted in a "dry" section of the panel. A "wet" section shall be provided for the sample conditioning systems, sink, etc.

5.6 Fire Protection System

Current plant fire protection for the steam plant area will be, as a minimum, per NFPA 850, "Fire Protection for Electric Generating Plants".

Fire water supply shall be from the existing plant underground loop system. 10" dia. undergroung (U/G) piping from the existing plant loop system shall be extended throughout for service to new equipment areas including the gasifier island.

Sprinkler systems (dry pipe or deluge) shall be provided as required for the following areas:

- steam turbine generator/utility building
- administration building
- maintenance building
- yard piping including fire hydrants, hose stations and post indicator valves (P.I.V.'s)
- propane system
- coal handling and storage systems

A CO_2 System shall be provided for the control room expansion.

5.7 Buildings

The steam turbine generator along with its auxiliary components (surface condenser, condensate pumps, boiler feed water pumps, boiler feed water heaters, water treating facilities, compressor and deaerator) will be housed in one building. The gasifier will be supported in a steel structure but will not be enclosed. The gas turbine generator set and ancillary subsystems will have their own, vendor-provided enclosures.

Two pre-engineered buildings will be constructed to provide new maintenance/machine shop facilities and administration offices. A car port of 40' x 120' will be built near the office and maintenance buildings.

The administration building will include the following:

- Reception Area
- Manager's Office and nine other single offices
- Lunch Room - 6-8 people seating
- Conference Room - 14 people
- Toilet Facilities for men and women and janitorial closet
- Locker and Shower Facility - 12 men and 8 women
- Utility Room

- Files/Prints/Storage Room
- Visitor Center - 30 people
- HVAC Facility for entire office building

Above will be a pre-engineered 50' x 100' building with finish appearance of office building, gypsum board partition walls and acoustical tile ceiling.

The maintenance building will include the following:

- Maintenance Supervisor's Office
- Tool Storage
- Welding Area/Lathe Benches
- Laydown Area
- Machinist's Work Area/Repair Shop
- Lunch Room - 10 people seating
- Toilet Facilities for men and women and janitorial closet
- Locker and Shower Facility - 24 men and 6 women

Above will be a pre-engineered 50' x 100' x 14' high building with insulated siding provided with louvers and exhaust fans (roof), roll-up door 10' wide x 12' high at each end, and 2 ton monorail.

All other equipment will be located outside without enclosures. Outside, small rotating equipment items will be provided as totally enclosed fan cooled or with equivalent protection.

The existing Unit 3 control room will be expanded to accommodate the Piñon Pine Project needs. Heated enclosures and/or heat tracing shall be provided for steam drum level controls, and any other system where freezing conditions may cause service interruptions.

5.8 Access Roads/Storm Water Treatment

5.8.1 Drainage and Erosion Control

Storm water control will be based on zero discharge. A number of small retention basins will be created during the initial stage of construction. All storm water during construction as well as during normal plant operation will be drained to the nearest basin.

Since the plant site receives very little precipitation, all of it will ultimately evaporate or be absorbed in the ground, and there will be no run-off.

5.8.2 Area Surfacing and Roads

Roads around combined-cycle area will be asphalt paved. Roads in material handling and out laying areas will be gravel or crushed stone finish. Also, all areas around major equipment foundations, cooling tower, stack and electrical substations will be gravel finish.

Heavy embankments or deep cuts along the railroad spur and other places will receive riprap to protect the soil from erosion.

6.0 ESTIMATED PLANT PERFORMANCE

The following table shows the approximate plant performance at the plant average ambient condition of 50°F, 20% RH.

PIÑON PINE POWER PROJECT ESTIMATED PLANT PERFORMANCE	
IGCC Item & Units*	**Quantity**
Coal Feed (TPD)*	880.6
Gas Turbine Power (MWe)	60.99
Steam Turbine Power (MWe)	46.23
Gross Power (MWe)	107.22
Auxiliary Power (MWe)	7.51
Net Power (MWe)	99.71
Net Heat Rate (Btu(LHV)/kWh)	8096
Net Heat Rate (Btu(HHV)/kWh)	8390
Thermal Efficiency (LHV) %	42.1
Thermal Efficiency (HHV) %	40.6

*Refer to Glossary

7.0 APPENDICES

7.1 Equipment List - Revision 9 dated 9/29/94

7.2 Process Flow Diagrams (PFD's)

Drawing No.	Description	Rev.
4141-2-50-112	Oxidant Compression and Supply Coal Gasification	5
4141-2-50-113	Coal Gasification	5
4141-2-50-114	Gas Stream Heat Recovery, Gas Stream Particulate Removal and Recycle Gas Compression	5
4141-2-50-116	Gas Stream Particulate Removal	5
4141-2-50-117	Desulfurization and Waste Solids Treatment	5
4141-2-50-118	Transport Desulfurization	1
MWK J-7514	Gasifier Island Heat and Material Balance - Base Case	3
4142-2-50-200	BFW/Steam/Condensate-Heat and Material Balance	D
4142-2-50-201	BFW/Steam/Condensate-Heat and Material Balance	D
4142-2-50-210	Gas Turbine Generator	C
4142-2-50-211	Heat Recovery Steam Generator	D
4142-2-50-212	Steam Turbine Generator	D
4142-2-50-213	Deaerator Heater & Blowdown Drums	D
4143-2-50-310	Solids Receiving, Storing & Crushing	H
4143-2-50-311	Wastewater Treatment	C
4143-2-50-312	Solid Waste Handling System	D
4143-2-50-313	Boiler Feedwater Treatment	C
4143-2-50-314	Cooling Water System	C
4143-2-50-315	River & Raw Water Systems	C
4143-2-50-316	Boiler Water Treatment	C
4143-2-50-317	Instrument & Plant Air System	C
4143-2-50-318	Flare System	C
4143-2-50-319	Propane System	C

7.3 Plot Plans

Drawing No.	Description	Rev.
61-D1	Gasifier Island - Overall	3
61-D2	Gasifier Island - Plan at Grade	3
61-D3	Gasifier Island - Plan at El. 97'-0" to El. 117'-0"	3
61-D4	Gaisifer Island - Plan at El. 117-0" to El. 137'-0"	3
61-D5	Gasifier Island - Plan at El. 137'-0" to El. 177'-0"	3
61-D6	Gasifier Island - Plan at El. 177'-0" and Above	3
61-D7	Gasifier Island - Plan South Elevation	3
61-D8	Gasifier Island - Plan Isometric View	3
61-D9	Gasifier Island - Plan West Elevation	3
4142-1-51-100	Site Key Plot Plan	D
4142-1-51-101	Key Plot Plan - Gasification Island, Combined-Cycle Power Island & Offsites	D
4142-1-51-102	Key Plot Plan - Offsites	D
4142-1-51-1	Steam Turbine at Grade	C
4142-1-51-2	Steam Turbine at Upper Level	C
4142-1-51-3	Gas Turbine	C
4142-1-51-4	HRSG at Grade	C
4142-1-51-5	HRSG at Upper Level	C
4142-1-51-6	Section 800 / 1200	C
4143-1-51-1	Section 100 and 1100 at Grade	C
4143-1-51-2	Section 100 and 1100 at Upper Level	C
4143-1-51-3	Coal Storage Dome	C
4143-1-51-4	Flare Stack	C
4143-1-51-5	Gasification Area (Rack only)	C
4143-1-51-6	Switchyard	C
4143-1-51-7	Transfer Sump	C
4143-1-51-8	Nitrogen Facility	C
4143-1-51-9	Cooling Tower	C
4143-1-51-10	Unloading Station	C

7.4 Heat and Material Balances

EQUIPMENT LIST

CONTRACT: 15-4140		SECTION 100 – SOLIDS RECEIVING, STORING AND CRUSHING 4143							
CLIENT: SIERRA PACIFIC POWER COMPANY		REV.	ORIG.	7	8	9	4	5	6
LOCATION: RENO, NEVADA – TRACY STATION		DATE	12/3/92	8/31/94	9/7/94	9/29/94	2/25/94	6/22/94	7/26/94
CLASS	ITEM NO.	DESCRIPTION	EFD	REQ. NO.	P.O. NO	REMARKS			REV.
FANS									
	B103	DELETED							
	B104	GASIFIER FEED DUST COLLECTION FAN	326	1356A					
	B104B	DELETED							
	B105	COAL RECEIVING EXHAUST FAN	325	1356A					
	B106	RAW COAL STORAGE EXHAUST FAN	326	1356A					
	B106B	DELETED							
	B107	DELETED							
	B108	DELETED							
	B109	DELETED							
	B110A	LIMESTONE TRANSPORT BLOWER	324						
	B110B	*SPARE FOR B110A*	324						
	B111	CRUSHING STATION DUST FILTER FAN	325	1356A					
	B112	COAL SILO FAN	324	1356A					
BINS									
	BN101A	RAW COAL RECEIVING HOPPER	321	1361A					
	BN101B	RAW COAL RECEIVING HOPPER	321	1361A					
	BN101C	DELETED							
	BN101D	DELETED							
	BN102	DELETED							
	BN104A	DELETED							
	BN104B	DELETED							
	BN105	COAL SILO	324	2345A					
	BN106	COKE SILO	324	2345A					
	BN107	LIMESTONE SILO	324	2345A					
	BN108	EMERGENCY RECLAIM HOPPER	322	1361A					
	BN109	EMERGENCY SURGE HOPPER	323	1361A					
BIN VIBRATORS									
	BV101A/B/C/D	DELETED							
	BV101E/F/G/H	DELETED							
	BV102	COAL SILO BIN DISCHARGER	324	1349A					
	BV103	COKE BIN DISCHARGER	324	1349A					
	BV104	LIMESTONE BIN DISCHARGER	324	1349A					
	BV105A	DELETED							
	BV105B	DELETED							
CONVEYORS	CR101	DELETED							
	CR102	RAW COAL TRANSFER CONVEYOR	321	1361A					
	CR103	DELETED							

EQUIPMENT LIST

CONTRACT: 15-4140		SECTION 100 – SOLIDS RECEIVING, STORING AND CRUSHING 4143							
CLIENT: SIERRA PACIFIC POWER COMPANY		REV.	ORIG.	7	8	9	4	5	6
LOCATION: RENO, NEVADA – TRACY STATION		DATE	12/3/92	8/31/94	9/7/94	9/29/94	2/25/94	6/22/94	7/26/94
CLASS	ITEM NO.	DESCRIPTION	EFD	REQ. NO.	P.O. NO	REMARKS			REV.
CONVEYORS CONT'D	CR104	DELETED							
	CR105	RAW COAL COLLECTING CONVEYOR	322	1361A					
	CR106	DELETED							
	CR107	DELETED							
	CR108	DELETED							
	CR109A	DELETED							
	CR109B	DELETED							
	CR110	GASIFIER FEED ELEVATING CONVEYOR	324	1361A					
	CR110B	*DELETED*							
	CR111	FILTER DISCHARGE CONVEYOR	325	1356A					
	CR112	DELETED							
	CR113	DELETED							
	CR114	OVERSIZE COAL ELEVATOR	323	1363A					
	CR115	SIZED COAL CONVEYOR	323	1361A					
	CR116	SAMPLE REJECT BUCKET ELEVATOR	321	1343A		PART OF PG103			
	CR117	EMERGENCY BY-PASS CONVEYOR	323	1361A					
	CR118	STACKING CONVEYOR	322	1369A		PART OF PG102			
DIVERTERS	DV101	DELETED							
	DV102	DELETED							
	DV103	DELETED							
	DV104	DELETED							
	DV105	COAL BY-PASS DIVERTER	323	1361A					
	DV106	COAL DUST BY-PASS DIVERTER	326	1356A					
DRUMS	D101	DELETED							
	D102A	DELETED							
	D102B	DELETED							
	D103	DELETED							
	D104	LIMESTONE TRANSPORTER							
FILTERS	F101	DELETED							
	F102	COAL SILO DUST FILTER	324	1356A					
	F103	COKE SILO EXHAUST FILTER	324	1356A					
	F104	LIMESTONE SILO EXHAUST FILTER	324	1356A					
	F105	GASIFIER FEED DUST FILTER	326	1356A					
	F105B	DELETED							
	F106	COAL RECEIVING DUST FILTER	325	1356A					
	F107	RAW COAL STORAGE DUST FILTER	326	1356A					

EQUIPMENT LIST

CONTRACT: 15-4140
CLIENT: SIERRA PACIFIC POWER COMPANY
LOCATION: RENO, NEVADA – TRACY STATION

SECTION 100 – SOLIDS RECEIVING, STORING AND CRUSHING
4143

CLASS	ITEM NO.	DESCRIPTION	EFD	REQ. NO.	P.O. NO	REMARKS
	REV.	ORIG.	7	8	9	4	5	6
	DATE	12/3/92	8/31/94	9/7/94	9/29/94	2/25/94	6/22/94	7/26/94
FILTERS CONT'D	F108	DELETED						
	F109	CRUSHING STATION DUST FILTER	325	1356A				
FEEDERS								
	FD101A	RAW COAL RECEIVING FEEDER	321	1361A				
	FD101B	RAW COAL RECEIVING FEEDER	321	1361A				
	FD101C	DELETED						
	FD101D	DELETED						
	FD102A/B/C/D	DELETED						
	FD102E/F/G/H	DELETED						
	FD103	DELETED						
	FD104	DELETED						
	FD105	DELETED						
	FD106	COAL SILO DISCHARGE FEEDER	324	1342A				
	FD106B	DELETED						
	FD107	COKE SILO DISCHARGE FEEDER	324	1342A				
	FD108	LIMESTONE SILO DISCHARGE FEEDER	324	1342A				
	FD108B	DELETED						
	FD109	DUST FILTER FEEDER	326	1356A				
	FD111	RECEIVING FILTER AIRLOCK FEEDER	325	1356A				
	FD112	RAW COAL STORAGE DUST FILTER FEEDER	326	1356A				
	FD113	DELETED	324					
	FD113B	DELETED						
	FD114A	COAL PILE DISCHARGE FEEDER	322	1361B				
	FD114B	COAL PILE DISCHARGE FEEDER	322	1361B				
	FD114C	DELETED						
	FD115	CRUSHING STATION DUST FILTER FEEDER	325	1356A				
	FD116	PRIMARY SAMPLE FEEDER	321	1343A		PART OF PG103		
	FD117	OVERSIZE COAL FEEDER	323					
	FD118	SECONDARY SAMPLE FEEDER	321	1343A		PART OF PG103		
HEATERS	H101	DELETED						
MISC.	X100	COAL STORAGE DOME	322	2499A				
PACKAGES	PG101	DELETED						
	PG102	STACKER – RECLAIMER PACKAGE	322	1369A				
	PG103	RAW COAL SAMPLING PACKAGE	321					

EQUIPMENT LIST

CONTRACT: 15-4140			SECTION 100 – SOLIDS RECEIVING, STORING AND CRUSHING 4143							
CLIENT: SIERRA PACIFIC POWER COMPANY			REV.	ORIG.	7	8	9	4	5	6
LOCATION: RENO, NEVADA – TRACY STATION			DATE	12/3/92	8/31/94	9/7/94	9/29/94	2/25/94	6/22/94	7/26/94
CLASS	ITEM NO.	DESCRIPTION	EFD	REQ. NO.	P.O. NO	REMARKS				REV.
PUMPS										
	P101A	UNLOADING STATION SUMP PUMP	321							
	P101B	SPARE FOR P101A	321							
	P102	DELETED								
	P103A	RECLAIM TUNNEL SUMP PUMP	322							
	P103B	SPARE FOR P103A	322							
RECLAIMERS										
	RL101	COAL PILE RECLAIMER	322	1369A		PART OF PG102				
SEPARATORS										
	S101	DELETED								
SIZING EQUIPMENT	SE101	RAW COAL MAGNETIC SEPARATOR	322	1359A						
	SE102	GASIFIER FEED MAGNETIC SEPARATOR	324	1359A						
	SE102B	DELETED								
	SE103	DELETED								
	SE104	COAL SCREEN	323	1355A						
SIZE REDUCTION	SR101	DELETED								
	SR102	COAL CRUSHER	323	1351B						
	SR103	PRIMARY SAMPLE CRUSHER	321	1343A						
SAMPLING	SS101	DELETED								
	SS102	DELETED								
	SS103	PRIMARY SAMPLER	321	1343A		PART OF PG103				
	SS104	SECONDARY SAMPLER	321	1343A		PART OF PG103				
SCALES										
	WS101	RAW COAL RECEIVING SCALE		1343A						
	WS102	TRUCK SCALE		1366A						

EQUIPMENT LIST

CONTRACT: 15-4140 CLIENT: SIERRA PACIFIC POWER COMPANY LOCATION: RENO, NEVADA – TRACY STATION			SECTION 200 – OXIDANT COMPRESSION AND SUPPLY								
			REV.	ORIG.	7	8	9	4	5	6	
			DATE	12/3/92	8/31/94	9/7/94	9/29/94	2/25/94	6/22/94	7/26/94	
CLASS	ITEM NO.	DESCRIPTION	EFD	REQ. NO.	P.O. NO	REMARKS					REV.
COMPRESSORS											
	C201	BOOST AIR COMPRESSOR									
	C201B	DELETED									
DRUMS											
	D201	KNOCK-OUT DRUM									
EXCHANGERS											
	E201	AIR RECUPERATOR									
	E202	TRIM COOLER									
	E203S1	AIR PRECOOLER									
	E203S2	AIR PRECOOLER									
	E204	TRANSPORT AIR COOLER									
	E205S1	LUBE OIL COOLER				PART OF C-201					
	E205S2	LUBE OIL COOLER				PART OF C-201					
PUMPS											
	P201	MAIN LUBE OIL PUMP				PART OF C-201					
	P202	AUX. LUBE OIL PUMP				PART OF C-201					

EQUIPMENT LIST

CONTRACT: 15-4140		SECTION 300 – COAL GAS., SOLIDS PRESS., FEEDING & ASH REMOVAL							
CLIENT: SIERRA PACIFIC POWER COMPANY		REV.	ORIG.	7	8	9	4	5	6
LOCATION: RENO, NEVADA – TRACY STATION		DATE	12/3/92	8/31/94	9/7/94	9/29/94	2/25/94	6/22/94	7/26/94
CLASS	ITEM NO.	DESCRIPTION	EFD	REQ. NO.	P.O. NO.	REMARKS			REV.
BINS									
	BN301	FEED SURGE BIN							
	BN302	FEED PRESSURIZATION HOPPER							
	BN303	FEED HOPPER							
COMPRESSORS									
	C301	PRESSURIZATION AIR COMPRESSOR							
	C301B	DELETED							
DRUMS									
	D301	PRESSURIZATION AIR RECEIVER							
	D302	AFTERCOOLER MOISTURE SEP.				PART OF C-301			
FILTERS									
	F301	FEED HOPPER VENT FILTER							
	F302	FEED SURGE BIN VENT FILTER							
FEEDERS									
	FD301	COAL FEEDER							
	FD302	ASH FEEDER							
HEATERS									
	H301	GASIFIER AND SULFATOR START-UP HEATER							
MISC.	EL301	PERSONNEL ELEVATOR							
	FT301	GASIFIER FEED TUBE				INSTALLED IN R301			
REACTORS	R301	GASIFIER							
SEPARATORS	S301	GASIFIER CYCLONE							
EXCHANGERS	E301	AFTERCOOLER				PART OF C301			
PACKAGE	PG301	COAL/LIMESTONE FEED PACKAGE							

EQUIPMENT LIST

CONTRACT: 15-4140		SECTION 400 – GAS STREAM HEAT RECOVERY							
CLIENT: SIERRA PACIFIC POWER COMPANY		REV.	ORIG.	7	8	9	4	5	6
LOCATION: RENO, NEVADA – TRACY STATION		DATE	12/3/92	8/31/94	9/7/94	9/29/94	2/25/94	6/22/94	7/26/94
CLASS	ITEM NO.	DESCRIPTION	EFD	REQ. NO.	P.O. NO	REMARKS			REV.
EXCHANGERS									
	E401	PRODUCT GAS COOLER							
	E402S1	RECYCLE GAS COOLER				IN SERIES WITH E402S2			
	E402S2	RECYCLE GAS COOLER				IN SERIES WITH E402S1			
	E403	PRODUCT GAS TRIM COOLER							
STEAM GENERATORS	SG401	GASIFIER STEAM DRUM				1075 psia			
SEPARATORS									
	S401	DESULFURIZER FEED CYCLONE							9

EQUIPMENT LIST

CONTRACT: 15-4140 CLIENT: SIERRA PACIFIC POWER COMPANY LOCATION: RENO, NEVADA – TRACY STATION			SECTION 500 – GAS STREAM PARTICULATE REMOVAL								
			REV.	ORIG.	7	8	9	4	5	6	
			DATE	12/3/92	8/31/94	9/7/94	9/29/94	2/25/94	6/22/94	7/26/94	
CLASS	ITEM NO.	DESCRIPTION	EFD	REQ. NO.	P.O. NO.	REMARKS					REV.
BINS											
	BN501	ASH COLLECTION HOPPER				PART OF PG502					
	BN502	ASH DEPRESSURIZATION HOPPER				PART OF PG502					
	BN503	FILTER FINES COLLECTION HOPPER				PART OF PG503					
	BN504	FILTER FINES DEPRESS. HOPPER				PART OF PG503					
	BN505	LIMESTONE FEED HOPPER									
	BN507	FILTER FINES FEED HOPPER				PART OF PG503					
	BN508	ASH FEED HOPPER				PART OF PG502					
	BN512	DELETED									
	BN513	DELETED									
DRUMS	D501	HEAT TRANS. FLUID SURGE DRUM				PART OF PG501					
EXCHANGERS											
	E501	FILTER FINES SCREW COOLER									
	E502	HEAT TRANS. FLUID COOLER				PART OF PG501					
FILTERS											
	F501	HOT GAS FILTER									
	F502	ASH VENT FILTER				PART OF PG502					
	F503	FILTER FINES VENT FILTER				PART OF PG503					
	F504	LIMESTONE FEED HOPPER VENT FILTER									
	F505	ASH COLLECTION HOPPER VENT FILTER									9
PACKAGES											
	PG501	FINES HEAT TRANSFER FLUID SYSTEM									
	PG502	ASH COLLECTION SYSTEM PACKAGE									
	PG503	FILTER FINES COLLECTION SYSTEM PKG.									
SEPARATORS											
	S501	DELETED									
PUMPS											
	P501A	HEAT TRANS. FLUID CIRC. PUMP				PART OF PG501					
	P501B	SPACE FOR P501A				PART OF PG501					

EQUIPMENT LIST

CONTRACT: 15-4140			SECTION 600 – DESULFURIZATION							
CLIENT: SIERRA PACIFIC POWER COMPANY			REV.	ORIG.	7	8	9	4	5	6
LOCATION: RENO, NEVADA – TRACY STATION			DATE	12/3/92	8/31/94	9/7/94	9/29/94	2/25/94	6/22/94	7/26/94
CLASS	ITEM NO.	DESCRIPTION	EFD	REQ. NO.	P.O. NO	REMARKS				REV.
FANS	B601A	DELETED								
	B601B	DELETED								
BINS	BN601	SULFATOR SOLIDS COLLECTION HOPPER								
	BN602	DELETED								
	BN603	SORBENT STORAGE HOPPER								
	BN604	SORBENT FEED HOPPER								
	BN605	SPENT SORBENT HOPPER								
COMPRESSORS										
	C601	SULFATOR AIR COMPRESSOR								
	C602	FINES COMBUSTOR AIR COMPRESSOR								9
DRUMS										
	D601	DELETED								
	D602	HRSG STEAM DRUM				PART OF SG602				
	D603	DELETED								
EXCHANGERS	E601	DELETED								
	E602	SULFATOR SOLIDS SCREW COOLER								
	E603	DELETED								
	E604	DELETED								
	E605	PRIMARY SOLIDS COOLER								
	E607	REGENERATOR EFFLUENT GAS COOLER								
	E610	LUBE OIL COOLER				PART OF C601				
FILTERS	F602	SULFATOR FLUE GAS BAG HOUSE FILTER								
	F603	DELETED								9
	F604	DELETED								9
	F605	SORBENT PRESSURIZATION HOPPER VENT FILTER								
	F606	DELETED								9
HEATERS	H601	DELETED								
	H602	FINES COMBUSTOR								
	H603	DELETED								9
	H608	SORBENT REGENERATION AIR HEATER								

EQUIPMENT LIST

CONTRACT: 15-4140
CLIENT: SIERRA PACIFIC POWER COMPANY
LOCATION: RENO, NEVADA - TRACY STATION

SECTION 600 - DESULFURIZATION

REV.	ORIG.	7	8	9	4	5	6
DATE	12/3/92	8/31/94	9/7/94	9/29/94	2/25/94	6/22/94	7/26/94

CLASS	ITEM NO.	DESCRIPTION	EFD	REQ. NO.	P.O. NO.	REMARKS	REV.
REACTORS							
	R601A	DELETED					
	R601B	DELETED					
	R601C	DELETED					
	R602	SULFATOR					
	R603	TRANSPORT DESULFURIZER					
	R604	TRANSPORT REGENERATOR					
SEPARATORS							
	S601	SULFATOR CYCLONE					
	S602	DELETED					9
	S603	DESULFURIZER CYCLONE					
	S604	REGENERATOR CYCLONE					
PUMPS	P601	MAIN LUBE OIL PUMP				PART OF C601	
	P602	AUX. LUBE OIL PUMP				PART OF C601	
CONVEYORS	CR602	BAG HOUSE SCREW CONVEYOR				PART OF F602	
SIZING EQUIPMENT	SE601	DELETED					
STEAM GENERATORS	SG601	DELETED					
	SG602	HEAT RECOVERY STEAM GENERATOR					
SIZE REDUCTION	SR601	DELETED					

EQUIPMENT LIST

CONTRACT: 15-4140		SECTION 700 – GAS TURBINE/GENERATOR							
CLIENT: SIERRA PACIFIC POWER COMPANY		REV.	ORIG.	7	8	9	4	5	6
LOCATION: RENO, NEVADA – TRACY STATION		DATE	12/3/92	8/31/94	9/7/94	9/29/94	2/25/94	6/22/94	&7/26/94
CLASS	ITEM NO. DESCRIPTION	EFD	REQ. NO.	P.O. NO.	REMARKS				REV.
GAS TURBINES									
	GT701 GAS TURBINE GENERATOR	221							

EQUIPMENT LIST

CONTRACT: 15-4140 CLIENT: SIERRA PACIFIC POWER COMPANY LOCATION: RENO, NEVADA – TRACY STATION			SECTION 800 – STEAM TURBINE/GENERATOR 4142							
			REV.	ORIG.	7	8	9	4	5	6
			DATE	12/3/92	8/31/94	9/7/94	9/29/94	2/25/94	6/22/94	7/26/94
CLASS	ITEM NO.	DESCRIPTION	EFD	REQ. NO.	P.O. NO	REMARKS				REV.
DEAERATING HEATERS	DH801	DEAERATOR HEATER	226	1934A						
DESUPER-HEATERS	DS801	MAIN STEAM ATTEMPERATOR	222			PART OF SG801				
	DS802	MP STEAM DESUPERHEATER	227							
	DS803	PEGGING STEAM DESUPERHEATER								
DRUMS	D801	MAIN STEAM DRUM	222			PART OF SG801				
	D802	LOW PRESSURE STEAM DRUM	223			PART OF SG801				
	D803	CONTINUOUS BLOWDOWN DRUM	225							
	D804	INTERMITTENT BLOWDOWN DRUM	225							
	D805	DELETED								
EJECTORS	J801A	DELETED								
	J801B	DELETED								
	J802A	DELETED								
	J802B	DELETED								
	J803	DELETED								
EXCHANGERS	E801	SURFACE CONDENSER	228	1219A						
	E802	GLAND CONDENSER				PART OF TG801				
	E803	DELETED								
	E804	DELETED								
	E805	DELETED								
EXPANSION JOINTS	EJ801	EXPANSION JOINT	228			BETWEEN TG801 AND E801				
	EJ802	EXPANSION JOINT	222			PART OF SG801				
	EJ803	EXPANSION JOINT	224			PART OF SG801				
HOISTS	HM801	STEAM TURBINE GENERATOR CRANE		1368A						

EQUIPMENT LIST

CONTRACT: 15-4140
CLIENT: SIERRA PACIFIC POWER COMPANY
LOCATION: RENO, NEVADA – TRACY STATION

SECTION 800 – STEAM TURBINE/GENERATOR
4142

	REV.	ORIG.	7	8	9	4	5	6	
	DATE	12/3/92	8/31/94	9/7/94	9/29/94	2/25/94	6/22/94	7/26/94	
CLASS	ITEM NO.	DESCRIPTION	EFD	REQ. NO.	P.O. NO.	REMARKS			REV.
PUMPS									
	P801A	HOTWELL CONDENSATE PUMP	228	1311B					
	P801B	SPARE FOR P801A	228	1311B					
	P802A	L.P. BOILER FEEDWATER PUMP	226	1311A					
	P802B	SPARE FOR P802A	226	1311A					
	P803A	H.P. BOILER FEEDWATER PUMP	226	1311C					
	P803B	SPARE FOR P803A	226	1311C					
	P804A	VACUUM PUMP	228			PART OF E801			
	P804B	SPARE FOR P804A	228			PART OF E801			
SAMPLE COOLERS	SC801	SAMPLE COOLER	222			@ D801 B.D.			
	SC802	SAMPLE COOLER	223			@ D802 B.D.			
	SC803	SAMPLE COOLER	226			@ DH801			
	SC804	SAMPLE COOLER	222						
	SC805	SAMPLE COOLER	223						
SILENCERS	SL801	DELETED							
STACKS	ST801	STACK	224	2926A					
STEAM GENERATORS	SG801	HEAT RECOVERY STEAM GENERATOR	222	1921A					
STEAM TURBINES	TG801	STEAM TURBINE GENERATOR	227	1332B					

EQUIPMENT LIST

CONTRACT: 15-4140 CLIENT: SIERRA PACIFIC POWER COMPANY LOCATION: RENO, NEVADA – TRACY STATION		SECTION 900 – RECYCLE GAS COMPRESSION							
		REV.	ORIG.	7	8	9	4	5	6
		DATE	12/3/92	8/31/94	9/7/94	9/29/94	2/25/94	6/22/94	7/26/94
CLASS	ITEM NO.	DESCRIPTION	EFD	REQ. NO.	P.O. NO.	REMARKS			REV.
COMPRESSORS									
	C901	RECYCLE GAS COMPRESSOR							
	C901B	DELETED							
	C902	RECYCLE GAS BOOSTER COMPRESSOR							
	C902B	DELETED							
DRUMS									
	D901	RECYCLE GAS RECEIVER							
	D902	RECYCLE GAS BOOSTER COMP. K. O. DRUM							
EXCHANGERS									
	E901	RECYCLE GAS BOOSTER COMPRESSOR TRIM COOLER							

EQUIPMENT LIST

F:		SECTION 1000 – WASTE WATER TREATMENT								
CONTRACT:	15-4140	4143								
CLIENT:	SIERRA PACIFIC POWER COMPANY	REV.	ORIG.	7	8	9	4	5	6	
LOCATION:	RENO, NEVADA – TRACY STATION	DATE	12/3/92	8/31/94	9/7/94	9/29/94	2/25/94	6/22/94	7/26/94	
CLASS	ITEM NO.	DESCRIPTION	EFD	REQ. NO.	P.O. NO	REMARKS				REV.
BASINS	X1000	DELETED								
PACKAGES	PG1001	TOWER BLOWDOWN TREATMENT PACKAGE								
MISC.	SX1000A to K	SPRAY MODULES				FOR WASTEWATER POND				
PUMPS	P1001A	DIRTY WASTEWATER PUMPS	339							
	P1001B	SPARE FOR P1001A	339							
	P1002A	CLEAN WASTEWATER PUMP	339							
	P1002B	SPARE FOR P1002A	339							
	P1003A	CLARIFIER EFFLUENT PUMP				PART OF PG1001				
	P1003B	SPARE FOR P1003A				PART OF PG1001				
	P1004A	CLARIFIER BLOWDOWN PUMP				PART OF PG1001				
	P1004B	SPARE FOR P1004A				PART OF PG1001				
	P1005A	SLUDGE SUMP PUMP				PART OF PG1001				
	P1005B	SPARE FOR P1005A				PART OF PG1001				
	P1006A	THICKENER SLUDGE PUMP				PART OF PG1001				
	P1006B	SPARE FOR P1006A				PART OF PG1001				
	P1007A	CAUSTIC PUMP				PART OF PG1001				
	P1007B	SPARE FOR P1007A				PART OF PG1001				
	P1008A	SODA ASH PUMP				PART OF PG1001				
	P1008B	SPARE FOR P1008A				PART OF PG1001				
	P1009A	MAGNESIUM CHLORIDE PUMP				PART OF PG1001				
	P1009B	SPARE FOR P1009A				PART OF PG1001				
CLARIFIERS	CL1001	REACTOR CLARIFIER				PART OF PG1001				
	CL1002	THICKENER				PART OF PG1001				
FILTERS	F1001	PLATE FILTER PRESS				PART OF PG1001				
FEEDER	FR1001	SODA ASH FEEDER				PART OF PG1001				
DRUMS	D1001	CAUSTIC TANK				PART OF PG1001				
TANKS	TK1001	CLARIFIER EFFLUENT AGING TANK				PART OF PG1001				
	TK1002	MAGNESIUM CHLORIDE TANK				PART OF PG1001				
	TK1003	SODA ASH TANK				PART OF PG1001				

EQUIPMENT LIST

CONTRACT: 15-4140 CLIENT: SIERRA PACIFIC POWER COMPANY LOCATION: RENO, NEVADA – TRACY STATION		SECTION 1100 – SOLID WASTE DISPOSAL 4143							
		REV.	ORIG.	7	8	9	4	5	6
		DATE	12/3/92	8/31/94	9/7/94	9/29/94	2/25/94	6/22/94	7/26/94
CLASS	ITEM NO.	DESCRIPTION	EFD	REQ. NO.	P.O. NO	REMARKS			REV.
FANS									
	B1101	DELETED							
	B1102	LOAD-OUT EXHAUST FAN	327	1347A		PART OF PG1101			
	B1103A	PNEUMATIC TRANSPORT BLOWER	327						
	B1103B	SPARE FOR B1103A	327						
BINS	BN1101	SOLID WASTE SILO	327	2345A					
BIN VIBRATORS	BV1101	SOLID WASTE DISCHARGER	327	1349A					
CHUTES	CH1101	SOLID WASTE LOADING CHUTE	327	1347A		PART OF PG1101			
CONVEYORS	CR1101	DELETED							
	CR1102	DELETED							
DRUMS	D1101	SOLID WASTE TRANSPORTER							
	D1102	ASH TRANSPORTER							
FILTERS	F1101	SILO VENT FILTER	327	1356A					
	F1102	LOAD-OUT FILTER	327	1347A		PART OF PG1101			
PACKAGES	PG1101	SOLID WASTE LOAD OUT PACKAGE	327						
	XV1101	CUT-OFF ROTARY VALVE		1347A		PART OF PG1101			9

EQUIPMENT LIST

CONTRACT: 15-4140 CLIENT: SIERRA PACIFIC POWER COMPANY LOCATION: RENO, NEVADA -- TRACY STATION			SECTION 1200 – BALANCE OF PLANT 4143							
			REV.	ORIG.	7	8	9	4	5	6
			DATE	12/3/92	8/31/94	9/7/94	9/29/94	2/25/94	6/22/94	7/26/94
CLASS	ITEM NO.	DESCRIPTION	EFD	REQ. NO.	P.O. NO	REMARKS				REV.
FANS										
	B1201	PROPANE VAPORIZER FORCED DRAFT FAN				PART OF PG1204				
	B1202A	DEGASIFIER BLOWER	337			PART OF PG1201				
	B1202B	SPARE FOR B1202A	337			PART OF PG1201				
COMPRESSORS	C1201A	INSTRUMENT & PLANT AIR COMPRESSOR	334	1326A						
	C1201B	SPARE FOR C1201A	334	1326A						
	C1202	PROPANE INSTRUMENT AIR COMPRESSOR				PART OF PG1204				
	C1203	NITROGEN PKG AIR COMPRESSOR	341			PART OF PG1205				
	C1204	NITROGEN LP BOOSTER COMPRESSOR	341			PART OF PG1205				
	C1205	NITROGEN HP BOOSTER COMPRESSOR	341			PART OF PG1205				
COOLING TOWERS	CT1201	COOLING TOWER (CELL 1 & 2)	332	2924A						
		COOLING TOWER (CELL 3)	333							
DRUMS	D1201	ACID STORAGE DRUM	338							
	D1202	CAUSTIC STORAGE DRUM	338							
	D1203A	CATION UNIT	337			PART OF PG1201				
	D1203B	CATION UNIT	337			PART OF PG1201				
	D1203C	DELETED								
	D1204A	ANION UNIT	336			PART OF PG1201				
	D1204B	ANION UNIT	336			PART OF PG1201				
	D1204C	DELETED								
	D1205	PROPANE STORAGE DRUM				PART OF PG1204				
	D1206	PROPANE STORAGE DRUM				PART OF PG1204				
	D1207	INSTRUMENT & PLANT AIR RECEIVER	334			PART OF C1201A/B				

EQUIPMENT LIST

CONTRACT: 15-4140			SECTION 1200 – BALANCE OF PLANT 4143							
CLIENT: SIERRA PACIFIC POWER COMPANY			REV.	ORIG.	7	8	9	4	5	6
LOCATION: RENO, NEVADA – TRACY STATION			DATE	12/3/92	8/31/94	9/7/94	9/29/94	2/25/94	6/22/94	7/26/94
CLASS	ITEM NO.	DESCRIPTION	EFD	REQ. NO.	P.O. NO	REMARKS				REV.
DRUMS										
CONT'D	D1208	INHIBITOR DRUM	342							
	D1209	ACID DRUM	342							
	D1210	PROPANE INSTRUMENT AIR RECEIVER				PART OF PG1204				
	D1211A	MIXED BED UNIT	336			PART OF PG1201				
	D1211B	MIXED BED UNIT	336			PART OF PG1201				
DRYERS										
	DR1201A	INSTRUMENT & PLANT AIR DRYER	334			PART OF C1201A/B				
	DR1201B	SPARE FOR DR1201A	334			PART OF C1201A/B				
	DR1202	PROPANE INSTRUMENT AIR DRYER				PART OF PG1204				
EXCHANGERS										
	E1201	CAUSTIC WATER HEATER	338			PART OF PG1201				
	E1202	PROPANE VAPORIZER				PART OF PG1204				
	E1203A to G	LN2 VAPORIZER SKIDS				PART OF PG1205				
	E1204	DELETED								
	E1205	DELETED								9
FEEDERS	FD1201A	BIOCIDE FEEDER (CELL 1 & 2)	342			PART OF PG1202				
	FD1201B	BIOCIDE FEEDER (CELL 3)	342			PART OF PG1202				
FILTERS	F1201A	DELETED								
	F1201B	DELETED								
	F1201C	DELETED								
FLARES										
	FL1201	FLARE	340							
MIXERS										
	M1201	L.P. PHOSPHATE TANK MIXER	331			PART OF PG1203				
	M1202	DELETED								
PUMPS										
	P1201	COOLING TOWER MAKE-UP WATER PUMP	344							
	P1201B	DELETED								
	P1202A	RAW WATER PUMP	343							
	P1202B	SPARE FOR P1202A	343							

EQUIPMENT LIST

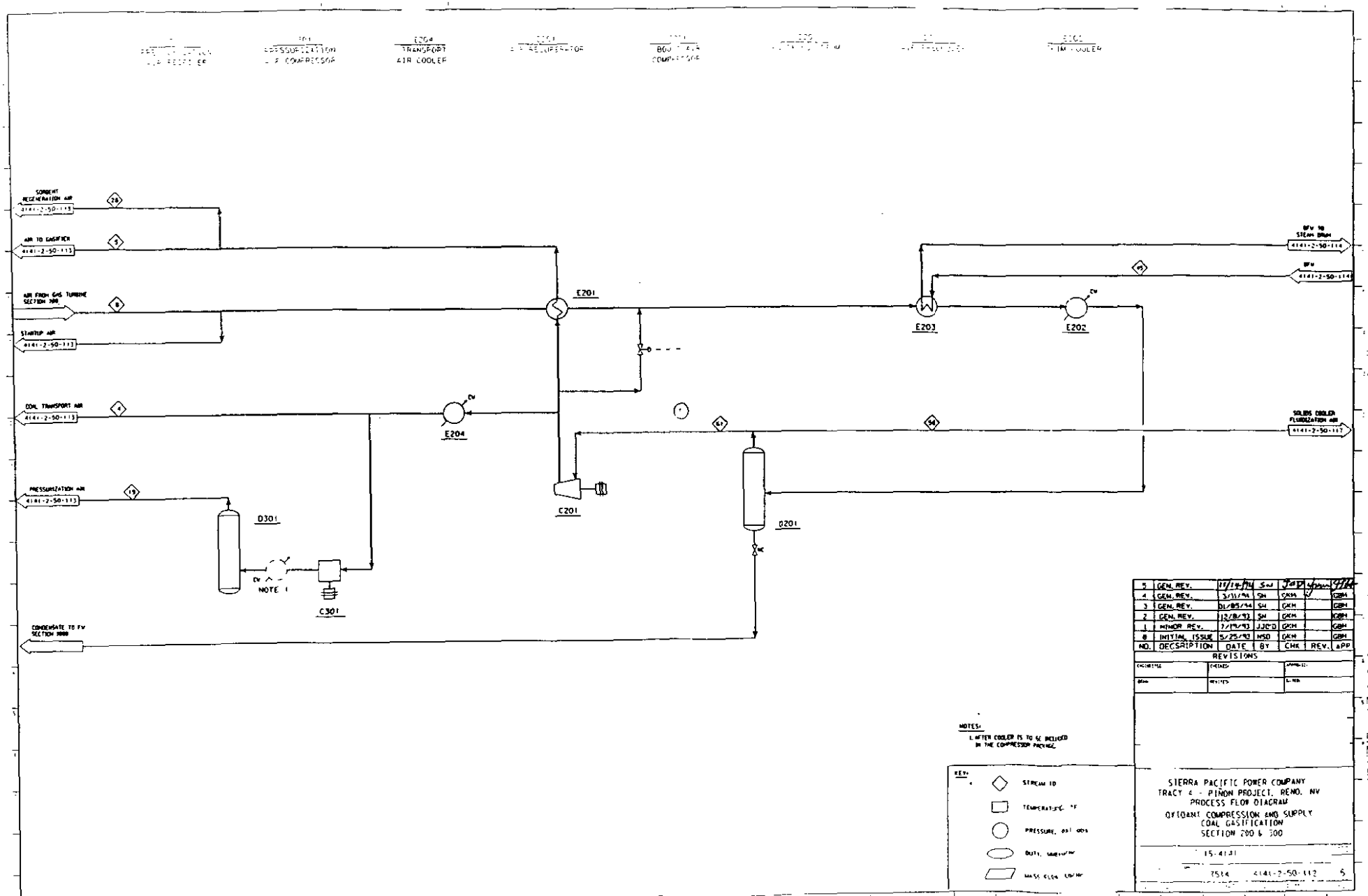
F CONTRACT: 15-4140 CLIENT: SIERRA PACIFIC POWER COMPANY LOCATION: RENO, NEVADA – TRACY STATION			SECTION 1200 – BALANCE OF PLANT 4143							
			REV.	ORIG.	7	8	9	4	5	6
			DATE	12/3/92	8/31/94	9/7/94	9/29/94	2/25/94	6/22/94	7/26/94
CLASS	ITEM NO.	DESCRIPTION	EFD	REQ. NO.	P.O. NO.	REMARKS				REV.
PUMPS CONT'D										
	P1203A	ACID REGENERATION PUMP	338			PART OF PG1201				
	P1203B	SPARE FOR P1203A AND P-1206	338			PART OF PG1201				
	P1204A	CAUSTIC REGENERATION PUMP	338			PART OF PG1201				
	P1204B	SPARE FOR P1204A AND P-1206	338			PART OF PG1201				
	P1205	ACID NEUTRALIZATION PUMP	338			PART OF PG1201				
	P1205B	DELETED								
	P1206	CAUSTIC NEUTRALIZATION PUMP	338			PART OF PG1201				
	P1206B	DELETED								
	P1207A	DELETED								
	P1207B	DELETED								
	P1208A	DEMINERALIZED WATER PUMP	335	1311B						
	P1208B	DEMINERALIZED WATER PUMP	335	1311B						
	P1208C	SPARE FOR P1208A/B		1311B						
	P1209A	CIRCULATING WATER PUMP	332	1311A						
	P1209B	CIRCULATING WATER PUMP	332	1311A						
	P1209C	SPARE FOR P1209A/B	332	1311A						
	P1210A	OXYGEN SCAVANGER PUMP	331			PART OF PG1203				
	P1210B	SPARE FOR P1210A	331			PART OF PG1203				
	P1211A	PHOSPHATE PUMP	331			PART OF PG1203				
	P1211B	PHOSPHATE PUMP	331			PART OF PG1203				
	P1211C	SPARE FOR P1211A/B/D/E	331			PART OF PG1203				
	P1211D	PHOSPHATE PUMP	331			PART OF PG1203				
	P1211E	PHOSPHATE PUMP	331							
	P1212A	DELETED								
	P1212B	DELETED								
	P1212C	DELETED								
	P1213A	AMINE PUMP	331			PART OF PG1203				
	P1213B	SPARE FOR P1213B	331			PART OF PG1203				

EQUIPMENT LIST

CONTRACT: 15-4140		SECTION 1200 – BALANCE OF PLANT 4143							
CLIENT: SIERRA PACIFIC POWER COMPANY		REV.	ORIG.	7	8	9	4	5	6
LOCATION: RENO, NEVADA – TRACY STATION		DATE	12/3/92	8/31/94	9/7/94	9/29/94	2/25/94	6/22/94	7/26/94
CLASS	ITEM NO.	DESCRIPTION	EFD	REQ. NO.	P.O. NO	REMARKS			REV.
PUMPS CONT'D	P1214A & C	INHIBITOR PUMPS	342			PART OF PG1202			
	P1214B	SPARE FOR P1214A & C	342			PART OF PG1202			
	P1215A & C	ACID PUMPS	342			PART OF PG1202			
	P1215B	SPARE FOR P1215A & C	342			PART OF PG1202			
	P1216A	PROPANE VAPORIZER FEED PUMP				PART OF PG1204			
	P1216B	SPARE FOR P1216A				PART OF PG1204			
	P1217A	BOOSTER PUMP	337			PART OF PG1201			
	P1217B	SPARE FOR P1217A	337			PART OF PG1201			
	P1218	LN2 TRANSFER PUMP	341			PART OF PG1205			
	P1219A	CIRCULATING WATER BOOSTER PUMP	345						
	P1219B	SPARE FOR P1219A	345						
	P1220A	CIRCULATING WATER PUMP (CELL 3)	333						
	P1220B	SPARE FOR P1220A	333						

EQUIPMENT LIST

CONTRACT: 15-4140			SECTION 1200 – BALANCE OF PLANT 4143								
CLIENT: SIERRA PACIFIC POWER COMPANY			REV.	ORIG.	7	8	9	4	5	6	
LOCATION: RENO, NEVADA – TRACY STATION			DATE	12/3/92	8/31/94	9/7/94	9/29/94	2/25/94	6/22/94	7/26/94	
CLASS	ITEM NO.	DESCRIPTION	EFD	REQ. NO.	P.O. NO.	REMARKS					REV.
PACKAGES											
	PG1201	DEMINERALIZATION PACKAGE	336	1932A							
	PG1202	CIRCULATING WATER TREATMENT PACKAGE	342								
	PG1203	BOILER WATER TREATMENT PACKAGE	331								
	PG1204	PROPANE PACKAGE									
	PG1205	NITROGEN PACKAGE	341								
	PG1206	COMPRESSED AIR PRETREATMENT SKID	341			PART OF PG1205					
SAMPLE COOLERS	SC1201	DELETED									
TANKS	TK1201A/B	DEMINERALIZED WATER TANKS	335								
	TK1202	NEUTRALIZATION TANK	335								
	TK1202B	DELETED									
	TK1203	PHOSPHATE TANK	331			PART OF PG1203					
	TK1205	HP LN2 STORAGE TANK	341			PART OF PG1205					
	TK1206	LP LN2 STORAGE TANK	341			PART OF PG1205					
TOWERS	T1201	DEGASIFIER	337			PART OF PG1201					
	T1202	NITROGEN PACKAGE COLD BOX	341			PART OF PG1205					



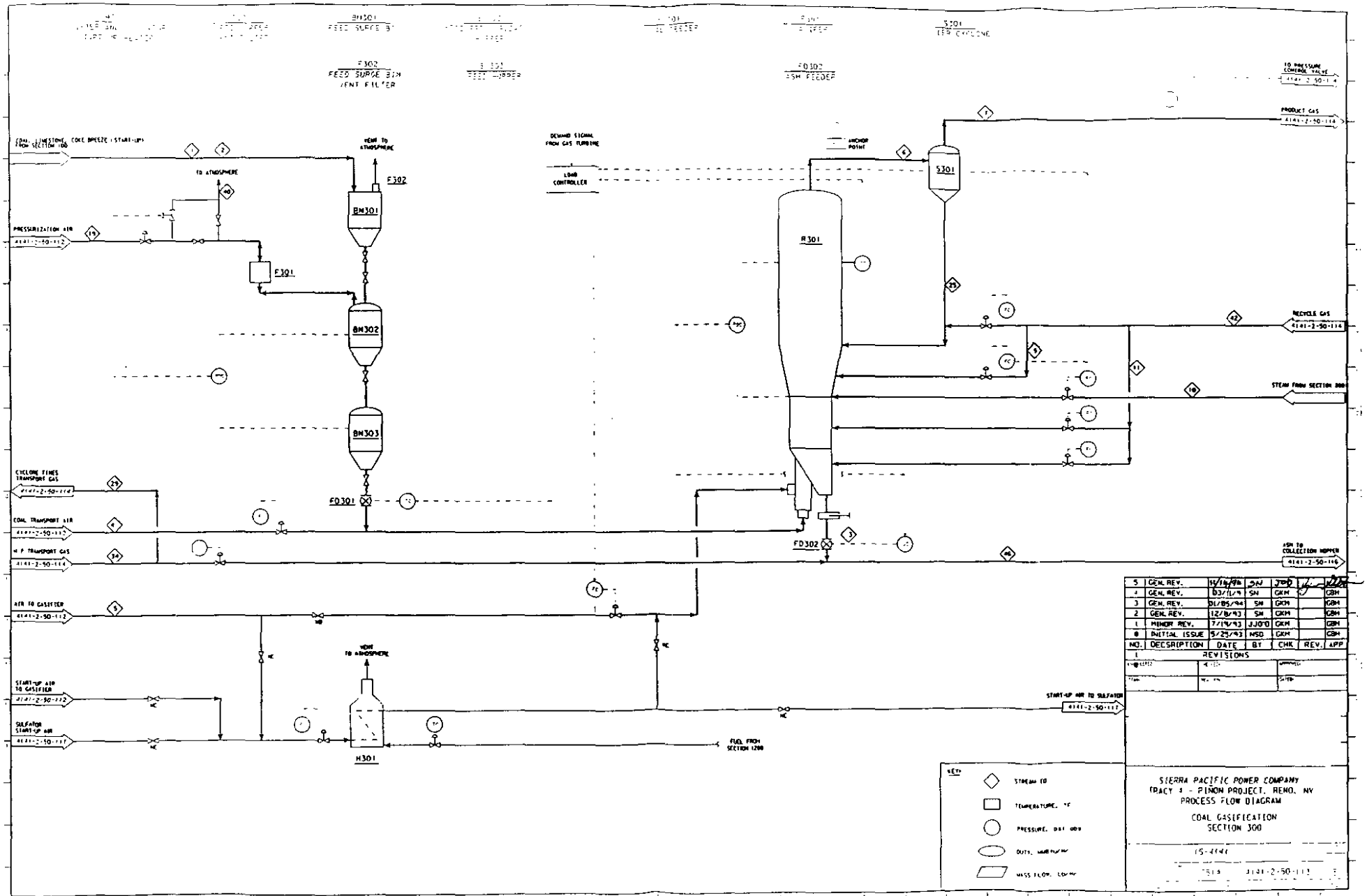
NO.	DESCRIPTION	DATE	BY	CHK	REV. APP
5	GEN. REV.	11/18/94	SM	JAP	
4	GEN. REV.	3/11/94	SM	GKM	GBM
3	GEN. REV.	01/05/94	SM	GKM	GBM
2	GEN. REV.	12/8/93	SM	GKM	GBM
1	MINOR REV.	7/19/93	JJC'D	GKM	GBM
0	INITIAL ISSUE	5/25/93	NSD	GKM	GBM

REVISIONS

SIERRA PACIFIC POWER COMPANY
TRACY 4 - PINON PROJECT, RENO, NV
PROCESS FLOW DIAGRAM
OXIDANT COMPRESSION AND SUPPLY
COAL GASIFICATION
SECTION 200 & 300

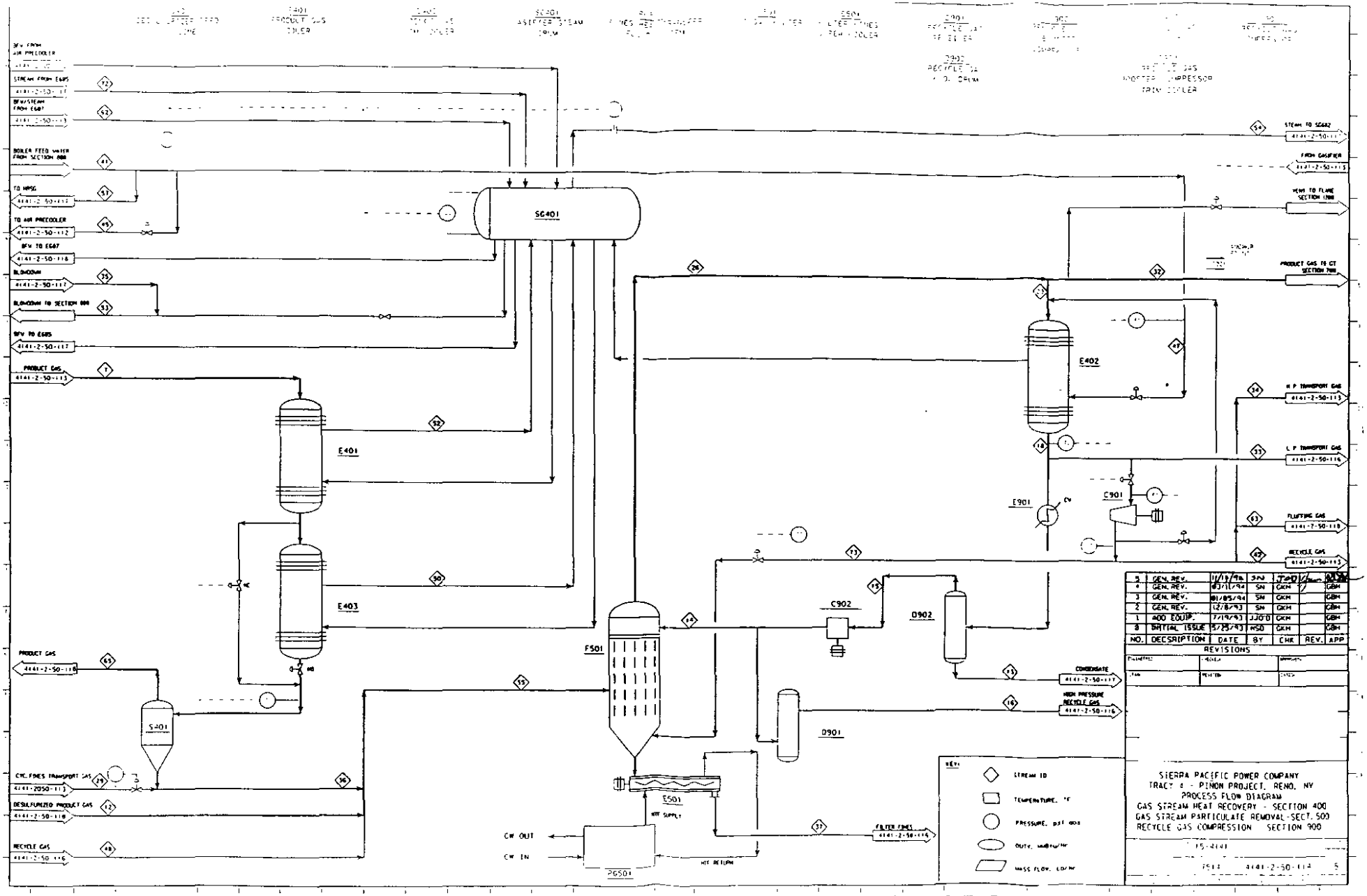
15-4131

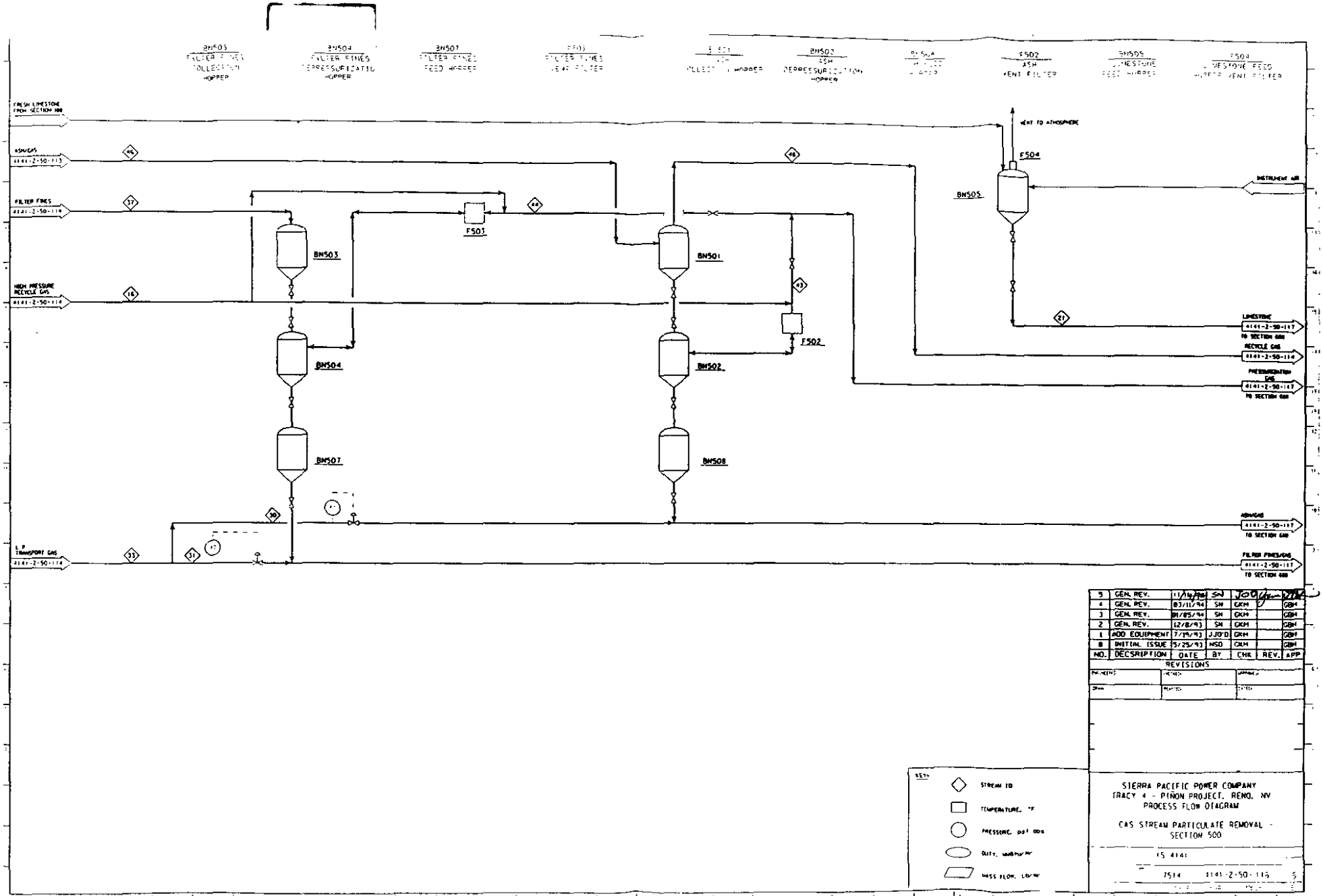
7514 4141-2-50-112 5



NO.	DESCRIPTION	DATE	BY	CHK	REV.	APP
5	GEN. REV.	11/16/94	SN	JJOO		GBH
4	GEN. REV.	03/1[illegible]/94	SN	GKM		GBH
3	GEN. REV.	01/05/94	SN	GKM		GBH
2	GEN. REV.	12/8/93	SN	GKM		GBH
1	MINOR REV.	7/19/93	JJOO	GKM		GBH
0	INITIAL ISSUE	5/25/93	NSO	GKM		GBH

REVISIONS


SG401
E401
E402
E403
E501
E901
C901
C902
D901
D902
F501
S401
P6501
BFW FROM AIR PRECOOLER
STREAM FROM E605
BFW/STEAM FROM E607
BOILER FEED WATER FROM SECTION 000
TO HRSG
TO AIR PRECOOLER
BFW TO E607
BLOWDOWN
BLOWDOWN TO SECTION 000
BFW TO E605
PRODUCT GAS
PRODUCT GAS
CYC. FINES TRANSPORT GAS
DESULFURIZED PRODUCT GAS
RECYCLE GAS
CW OUT
CW IN
HTF SUPPLY
HTF RETURN
STEAM TO SG402
FROM GASIFIER
VENT TO FLARE SECTION 1100
PRODUCT GAS TO GT SECTION 700
H P TRANSPORT GAS
L P TRANSPORT GAS
FLUFFING GAS
RECYCLE GAS
CONDENSATE
HIGH PRESSURE RECYCLE GAS
FILTER FINES
KEY:
STREAM ID
TEMPERATURE, °F
PRESSURE, psi abs
DUTY, MMBtu/Hr
MASS FLOW, LB/Hr
5 | GEN. REV. | 11/19/96 | SNJ | JJOD | GKH | GBH
4 | GEN. REV. | 05/11/94 | SN | GKH | GBH
3 | GEN. REV. | 01/05/94 | SN | GKH | GBH
2 | GEN. REV. | 12/8/93 | SN | GKH | GBH
1 | ADD EQUIP. | 7/19/93 | JJOD | GKH | GBH
0 | INITIAL ISSUE | 5/25/93 | MSD | GKH | GBH
NO. | DESCRIPTION | DATE | BY | CHK | REV. | APP
REVISIONS
SIERRA PACIFIC POWER COMPANY
TRACY 4 - PINON PROJECT, RENO, NV
PROCESS FLOW DIAGRAM
GAS STREAM HEAT RECOVERY - SECTION 400
GAS STREAM PARTICULATE REMOVAL-SECT. 500
RECYCLE GAS COMPRESSION SECTION 900
4141-2-50-114
5



NO.	DESCRIPTION	DATE	BY	CHK	REV.	APP
5	GEN. REV.	11/14/94	SNJ	JJO'D		
4	GEN. REV.	03/11/94	SN	GKM		GBH
3	GEN. REV.	01/05/94	SN	GKM		GBH
2	GEN. REV.	12/8/93	SN	GKM		GBH
1	ADD EQUIPMENT	7/19/93	JJO'D	GKM		GBH
0	INITIAL ISSUE	5/25/93	NSD	GKM		GBH

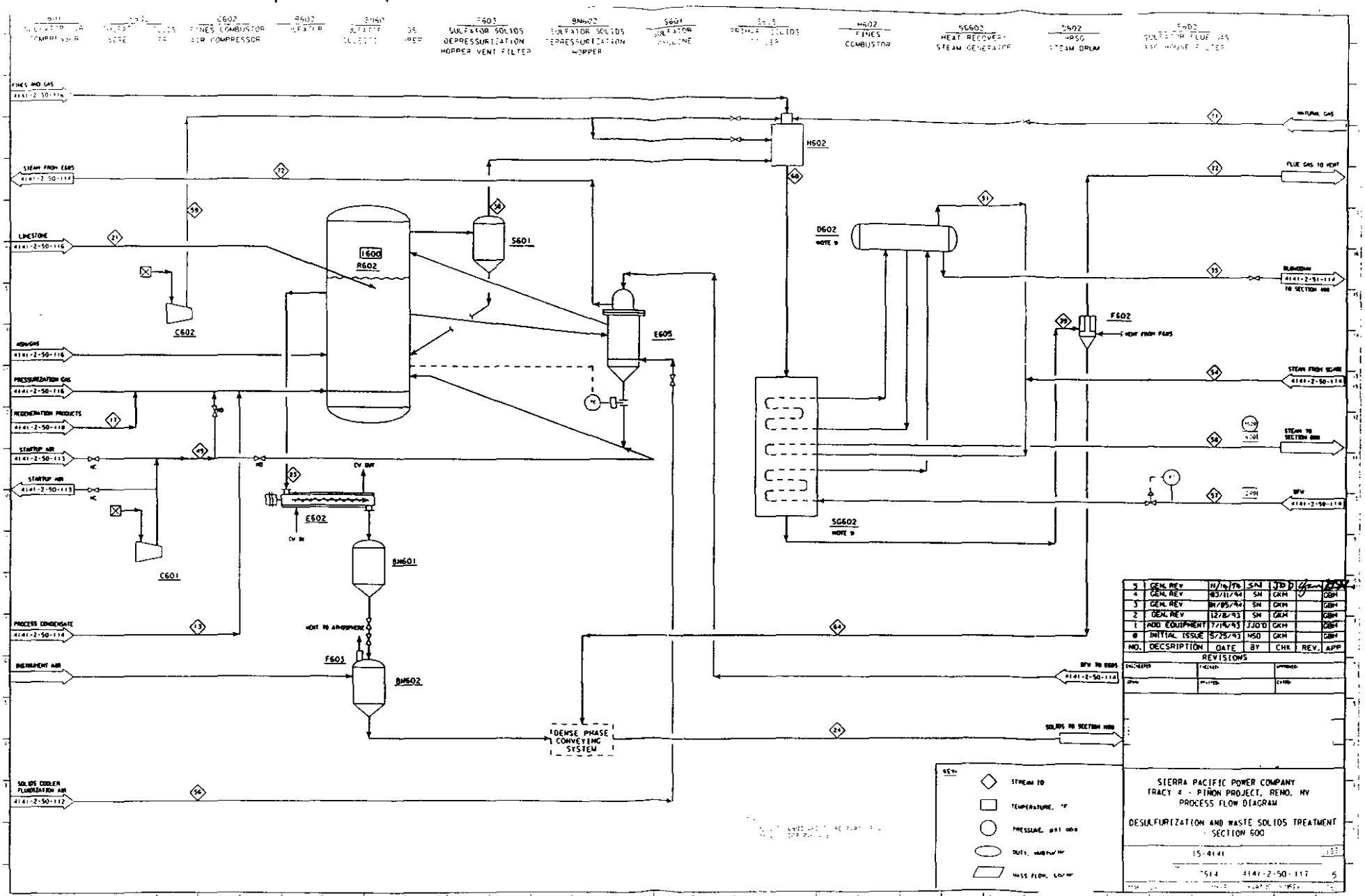
REVISIONS

SIERRA PACIFIC POWER COMPANY
TRACY 4 - PINON PROJECT, RENO, NV
PROCESS FLOW DIAGRAM

GAS STREAM PARTICULATE REMOVAL - SECTION 500

IS 4141

7514 4141-2-50-115 5



NO.	DESCRIPTION	DATE	BY	CHK	REV. APP
5	GEN. REV	11/14/96	SAJ	JJD	
4	GEN. REV	03/11/94	SN	GKM	GBH
3	GEN. REV	04/05/94	SN	GKM	GBH
2	GEN. REV	12/8/93	SN	GKM	GBH
1	ADD EQUIPMENT	7/14/93	JJD'D	GKM	GBH
0	INITIAL ISSUE	5/25/93	MSD	GKM	GBH

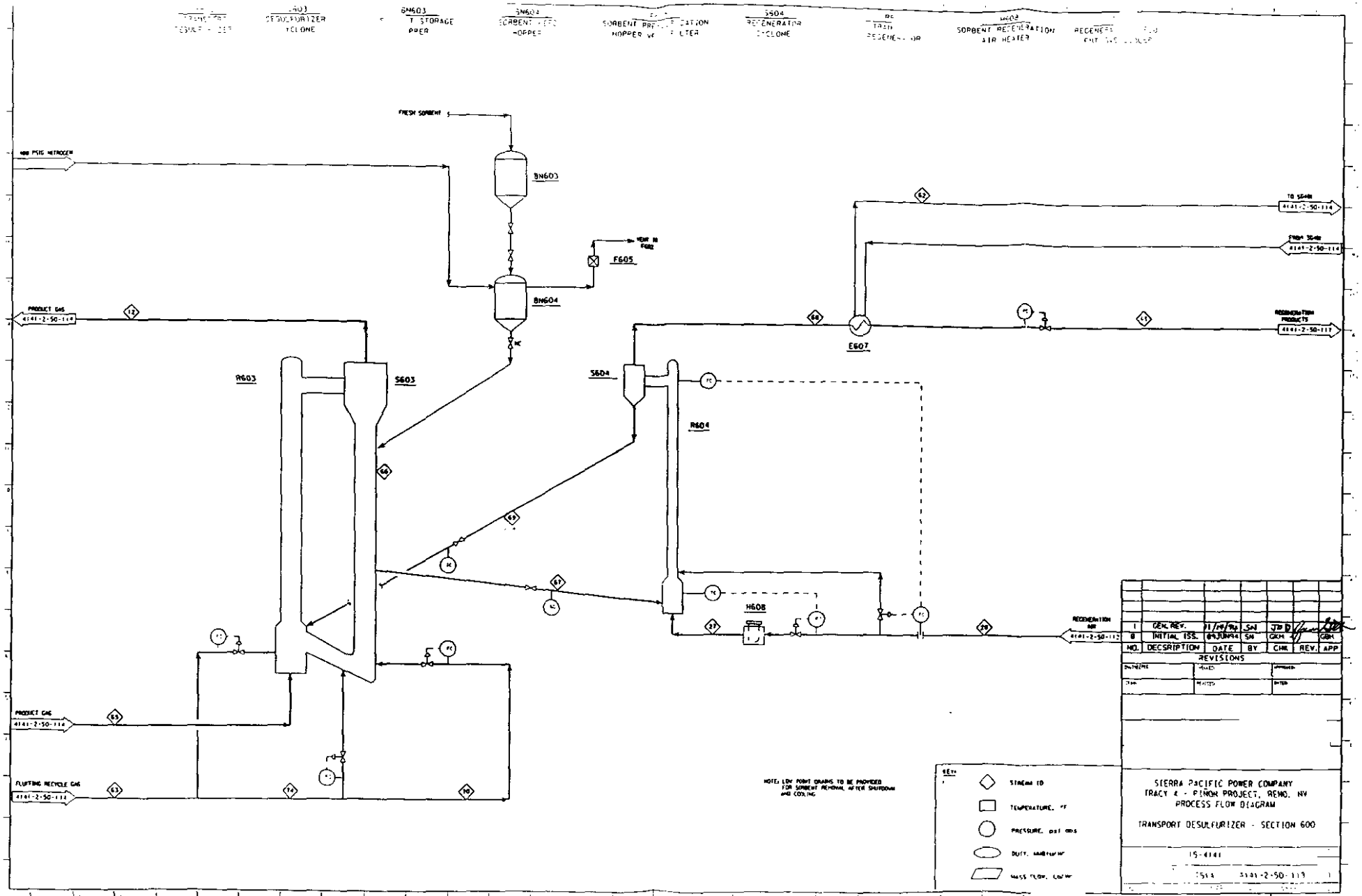
REVISIONS

SIERRA PACIFIC POWER COMPANY
TRACY 4 - PINON PROJECT, RENO, NV
PROCESS FLOW DIAGRAM

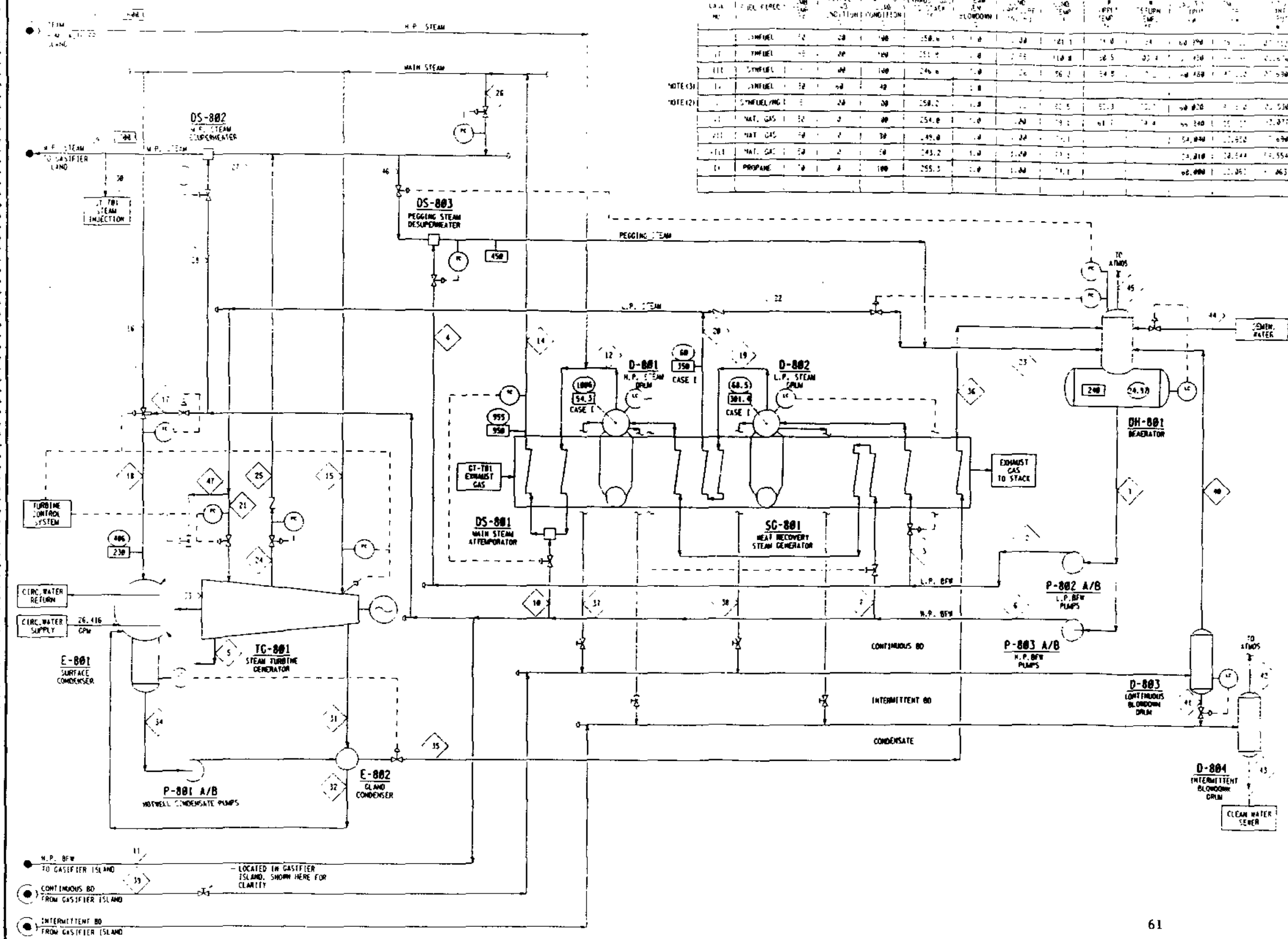
DESULFURIZATION AND WASTE SOLIDS TREATMENT - SECTION 600

IS-4141

4141-2-50-117


FRESH SORBENT
BN603
BN604
F605
E607
R603
S603
S604
R604
H608
TO S604
FROM S604
PRODUCT GAS
FLUFFING RECYCLE GAS
REGENERATION AIR
REGENERATION PRODUCTS
GEN. REV.
INITIAL ISS.
NO. DESCRIPTION DATE BY CHK REV. APP
REVISIONS
STREAM ID
TEMPERATURE, °F
PRESSURE, psi ABS
SIERRA PACIFIC POWER COMPANY
TRACY & - PINON PROJECT, RENO, NV
PROCESS FLOW DIAGRAM
TRANSPORT DESULFURIZER - SECTION 600
19-4141
5141-2-50-119

CASE NO.	FUEL FIRED	AMB TEMP °F	GASIFIER LOAD CONDITION %	GT LOAD CONDITION %	EXHAUST GAS TO STACK °F	STEAM GEN BLOWDOWN %	COND BACKPRESSURE	COND TEMP °F	SUPPLY TEMP °F	RETURN TEMP °F	[illegible]	[illegible]	[illegible]
[illegible]	SYNFUEL	[illegible]	20	100	258.6	1.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	SYNFUEL	[illegible]	20	100	[illegible]	1.0	[illegible]	110.8	58.5	[illegible]	[illegible]	[illegible]	[illegible]
III	SYNFUEL	[illegible]	20	100	246.6	1.0	[illegible]	56.2	54.5	[illegible]	[illegible]	[illegible]	27,590
NOTE (3) IV	SYNFUEL	52	60	40		1.0							
NOTE (2) [illegible]	SYNFUEL/NG	[illegible]	20	30	250.2	1.0	[illegible]	[illegible]	[illegible]	[illegible]	60,020	[illegible]	[illegible]
[illegible]	NAT. GAS	52	0	80	254.0	1.0	.20	[illegible]	61.7	[illegible]	55,340	[illegible]	[illegible]
VII	NAT. GAS	50	0	30	249.0	1.0	.20	[illegible]			54,040	[illegible]	[illegible]
VIII	NAT. GAS	50	0	50	243.2	1.0	1.20	[illegible]			24,010	28,544	[illegible]
IX	PROPANE	[illegible]	0	100	255.5	1.0	1.00	[illegible]			62,000	[illegible]	[illegible]



NOTES

1. REFER TO DWG. NO. 4142-2-50-201 FOR MATERIAL BALANCE PROCESS DATA.
2. SYNFUEL 30% NATURAL GAS.

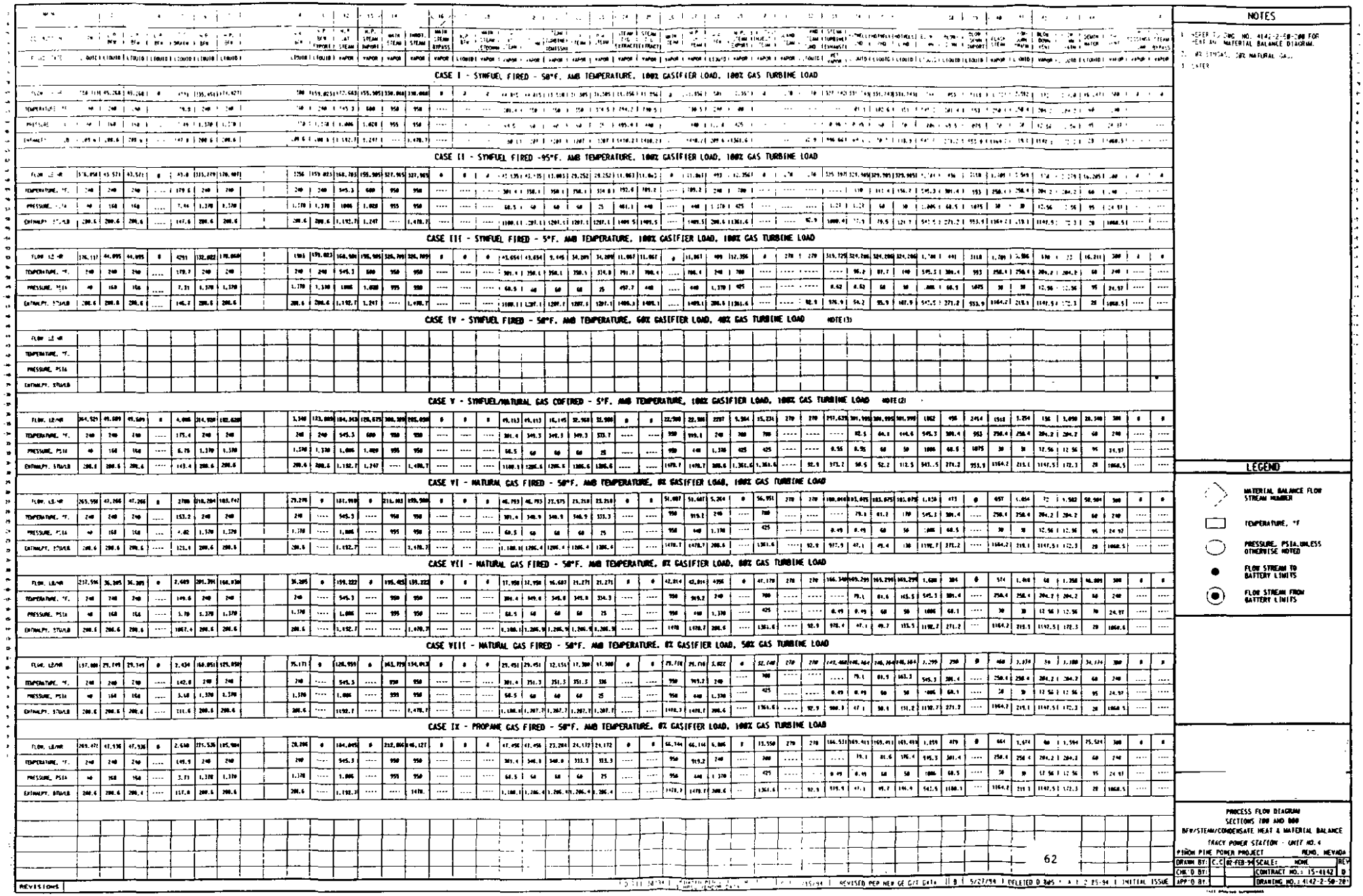
LEGEND

- ◇ MATERIAL BALANCE FLOW STREAM NUMBER
- ▭ TEMPERATURE, °F
- ◯ PRESSURE, PSIA, UNLESS OTHERWISE NOTED
- ● FLOW STREAM TO BATTERY LIMITS
- ◉ FLOW STREAM FROM BATTERY LIMITS

PROCESS FLOW DIAGRAM
SECTIONS 700 AND 800
BFW/STEAM/CONDENSATE HEAT & MATERIAL BALANCE
TRACY POWER STATION - UNIT NO. 4
PIÑON PINE POWER PROJECT — RENO, NEVADA

DRAWN BY:	C.C.	02 FEB 94	SCALE: NONE	REV
CHK'D BY:			CONTRACT NO.: 15-4142	D
APP'D BY:			DRAWING NO.: 4142-2-50-200	

REVISIONS: E 11/17/94 REVISED PER NEW GE G.T. DATA | B 5/27/94 DELETED D-805 | A 2/25/94 INITIAL ISSUE



CASE I - SYNFUEL FIRED - 50°F. AMB TEMPERATURE, 100% GASIFIER LOAD, 100% GAS TURBINE LOAD

CASE II - SYNFUEL FIRED -95°F. AMB TEMPERATURE, 100% GASIFIER LOAD, 100% GAS TURBINE LOAD

CASE III - SYNFUEL FIRED - 5°F. AMB TEMPERATURE, 100% GASIFIER LOAD, 100% GAS TURBINE LOAD

CASE IV - SYNFUEL FIRED - 50°F. AMB TEMPERATURE, 60% GASIFIER LOAD, 40% GAS TURBINE LOAD NOTE(3)

CASE V - SYNFUEL/NATURAL GAS COFIRED - 5°F. AMB TEMPERATURE, 100% GASIFIER LOAD, 100% GAS TURBINE LOAD NOTE(2)

CASE VI - NATURAL GAS FIRED - 50°F. AMB TEMPERATURE, 0% GASIFIER LOAD, 100% GAS TURBINE LOAD

CASE VII - NATURAL GAS FIRED - 50°F. AMB TEMPERATURE, 0% GASIFIER LOAD, 80% GAS TURBINE LOAD

CASE VIII - NATURAL GAS FIRED - 50°F. AMB TEMPERATURE, 0% GASIFIER LOAD, 50% GAS TURBINE LOAD

CASE IX - PROPANE GAS FIRED - 50°F. AMB TEMPERATURE, 0% GASIFIER LOAD, 100% GAS TURBINE LOAD

NOTES

1. REFER TO DWG NO. 4142-2-50-200 FOR HEAT AND MATERIAL BALANCE DIAGRAM.
2. 0% SYNGAS, 100% NATURAL GA...
3. LATER

LEGEND

- MATERIAL BALANCE FLOW STREAM NUMBER
- TEMPERATURE, °F
- PRESSURE, PSIA,UNLESS OTHERWISE NOTED
- FLOW STREAM TO BATTERY LIMITS
- FLOW STREAM FROM BATTERY LIMITS

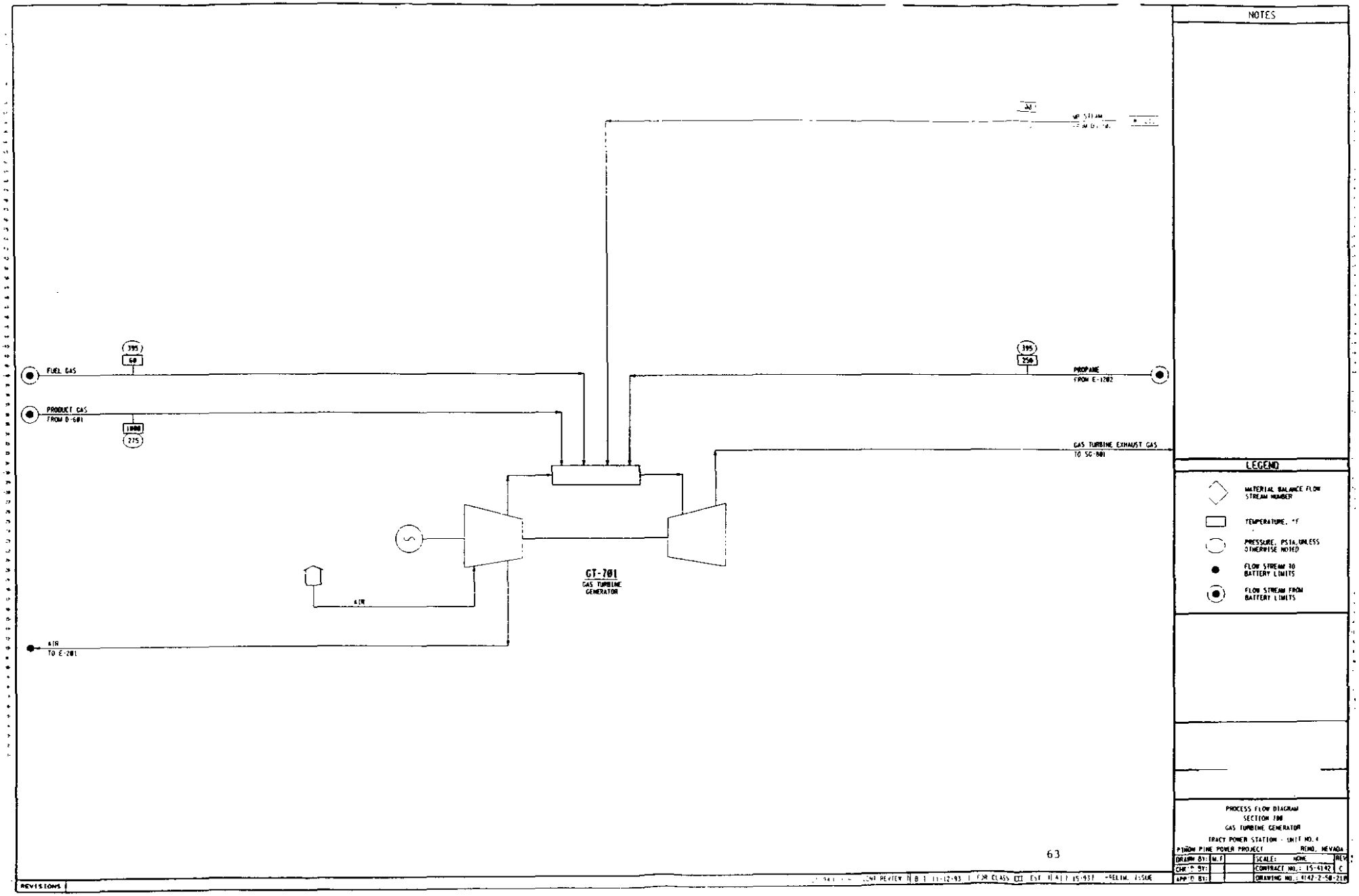
PROCESS FLOW DIAGRAM
SECTIONS 700 AND 800
BFW/STEAM/CONDENSATE HEAT & MATERIAL BALANCE
TRACY POWER STATION - UNIT NO. 4
PINON PINE POWER PROJECT RENO, NEVADA

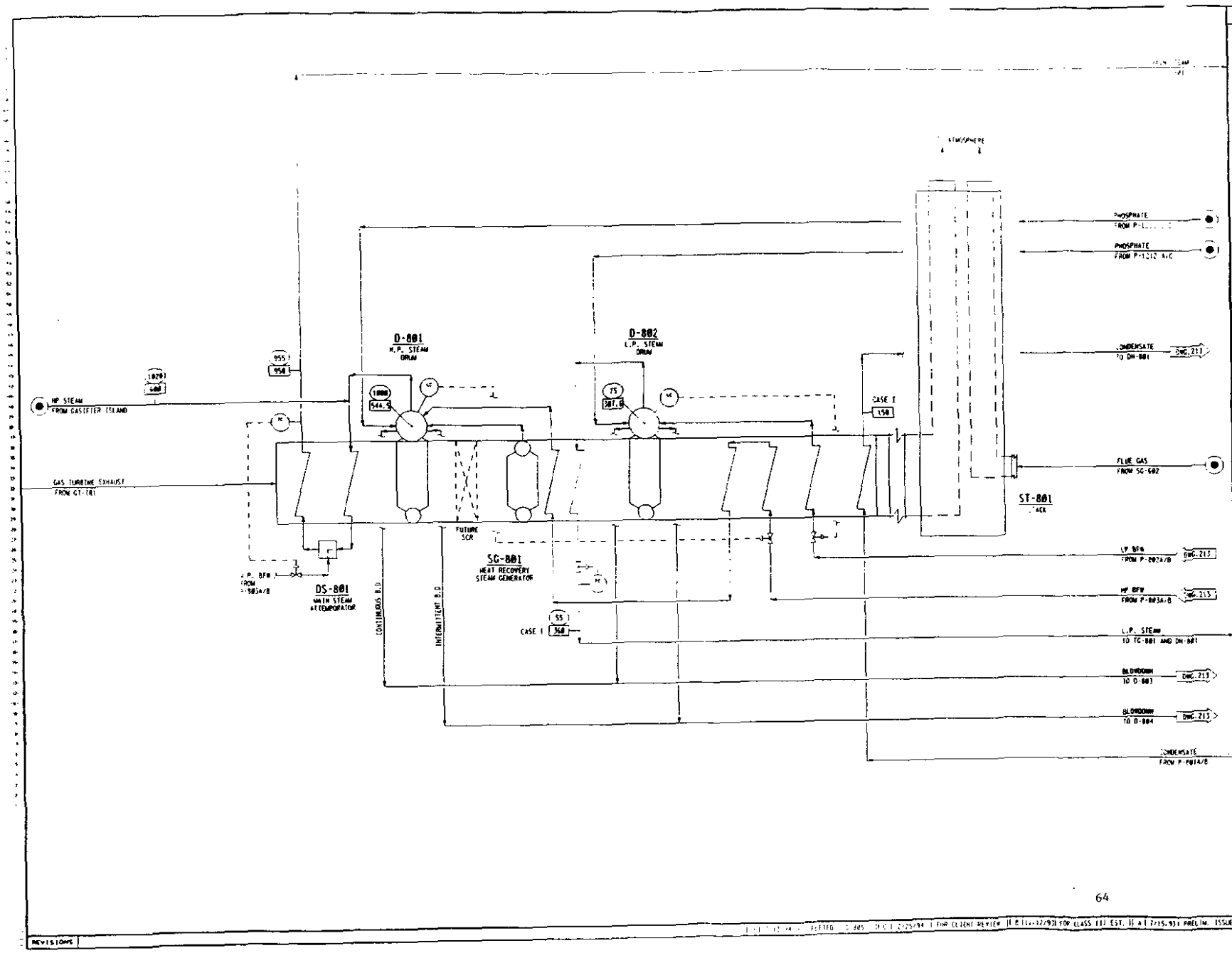
DRAWN BY:	C.C	02-FEB-94	SCALE: NONE
CHK'D BY:			CONTRACT NO.: 15-4142
APP'D BY:			DRAWING NO.: 4142-2-50-201

REV: 0

REVISIONS

5/27/94	REVISED PER NEW GE GAT Data	B	5/27/94	DELETED D 805
2-25-94	INITIAL ISSUE			


NOTES
LEGEND
MATERIAL BALANCE FLOW STREAM NUMBER
TEMPERATURE, °F
PRESSURE, PSIA, UNLESS OTHERWISE NOTED
FLOW STREAM TO BATTERY LIMITS
FLOW STREAM FROM BATTERY LIMITS
FUEL GAS
PRODUCT GAS
FROM D-601
PROPANE
FROM E-1202
GAS TURBINE EXHAUST GAS
TO SG-801
GT-701
GAS TURBINE GENERATOR
AIR
AIR
TO E-201
PROCESS FLOW DIAGRAM
SECTION 700
GAS TURBINE GENERATOR
TRACY POWER STATION - UNIT NO. 4
PINON PINE POWER PROJECT
RENO, NEVADA
DRAWN BY:
CHK'D BY:
APP'D BY:
SCALE: NONE
CONTRACT NO.: 15-4142
DRAWING NO.: 4142-2-50-210
REVISIONS



NOTES

LEGEND

- MATERIAL BALANCE FLOW STREAM NUMBER
- TEMPERATURE, °F
- PRESSURE, PSIA, UNLESS OTHERWISE NOTED
- FLOW STREAM TO BATTERY LIMITS
- FLOW STREAM FROM BATTERY LIMITS

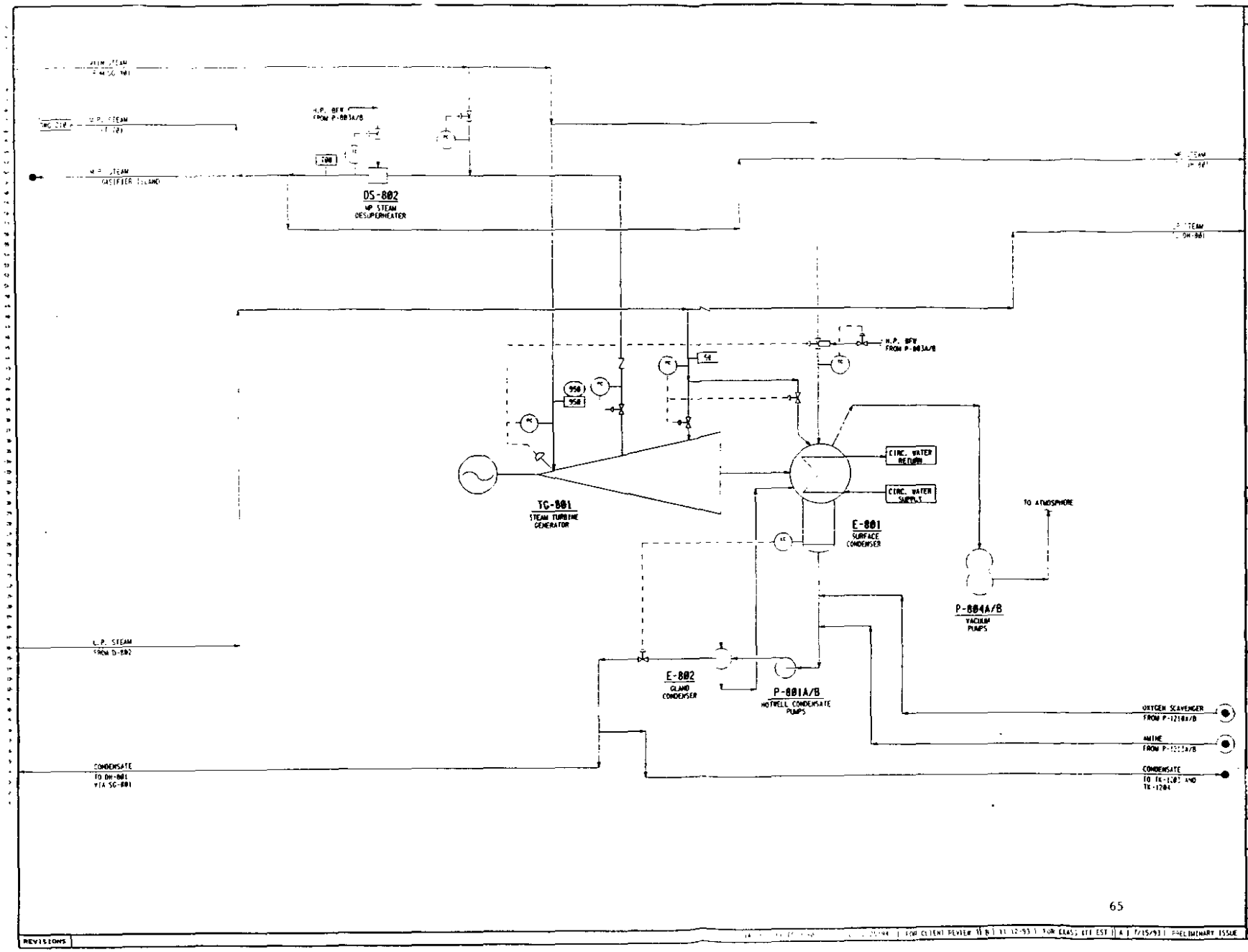
PROCESS FLOW DIAGRAM
SECTION 800
HEAT RECOVERY STEAM GENERATOR
TRACY POWER STATION - UNIT NO. 4
PINON PINE POWER PROJECT — RENO, NEVADA

DRAWN BY:	JMM 16-JUN 94	SCALE: NONE	REV
CHK'D BY:		CONTRACT NO.: 15.4442	0
APP'D BY:		DRAWING NO.: 4142-2-50-211	

REVISIONS

			2/25/94	FOR CLIENT REVIEW

11/93 FOR CLASS III EST. 7/15/93 PRELIM. ISSUE



NOTES

LEGEND

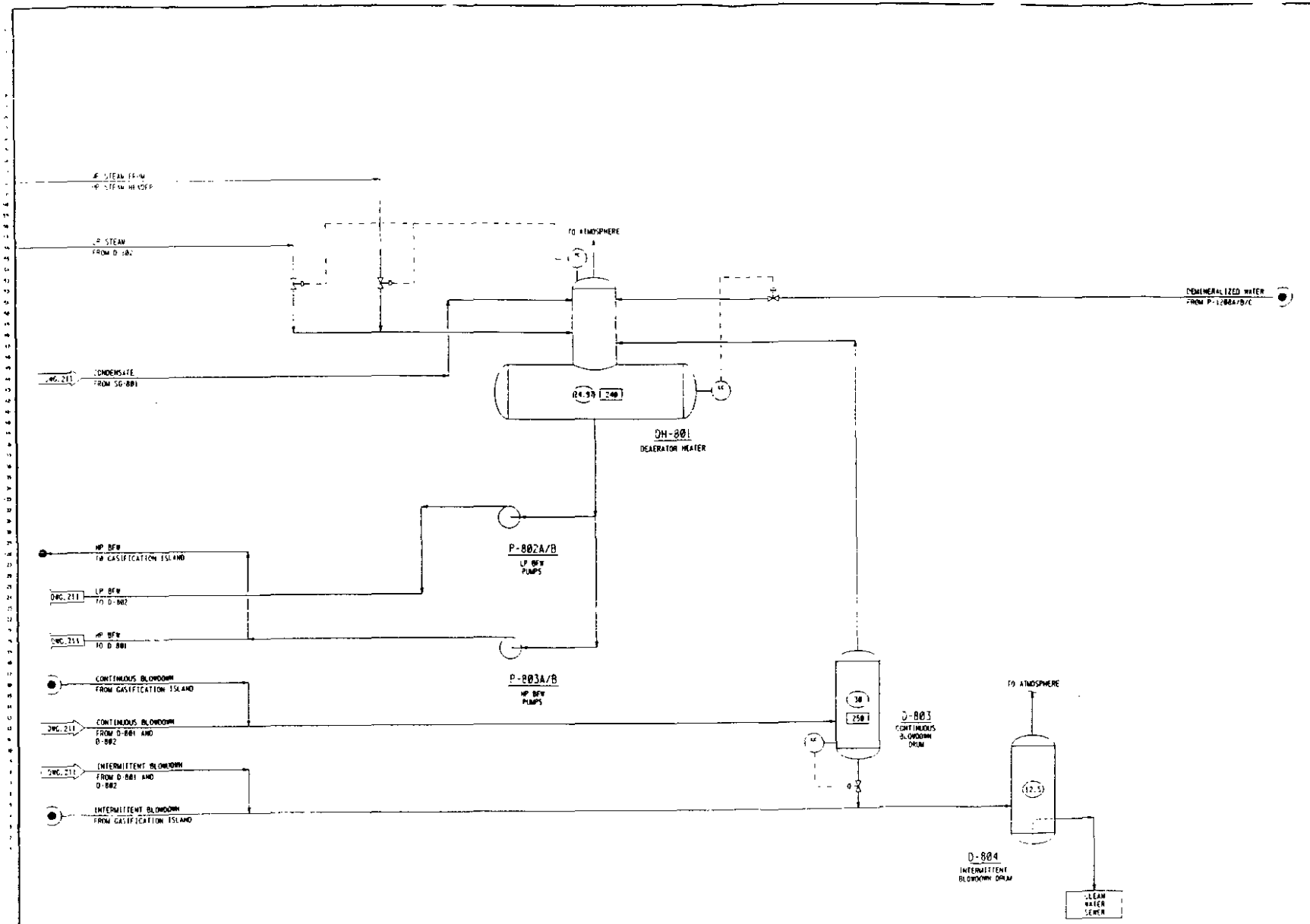
- MATERIAL BALANCE FLOW STREAM NUMBER
- TEMPERATURE, °F
- PRESSURE, PSIA, UNLESS OTHERWISE NOTED
- FLOW STREAM TO BATTERY LIMITS
- FLOW STREAM FROM BATTERY LIMITS

PROCESS FLOW DIAGRAM
SECTION 800
STEAM TURBINE GENERATOR
TRACY POWER STATION - UNIT NO. 4
PINON PINE POWER PROJECT RENO, NEVADA

DRAWN BY:		SCALE: NONE	REV
CHK'D BY:		CONTRACT NO.: 15-4142	B
APP'D BY:		DRAWING NO.: 4142-2-50-712	

REVISIONS

		FOR CLIENT REVIEW	11-12-93
		FOR CLASS III EST	7/15/93
		PRELIMINARY ISSUE	



NOTES

LEGEND

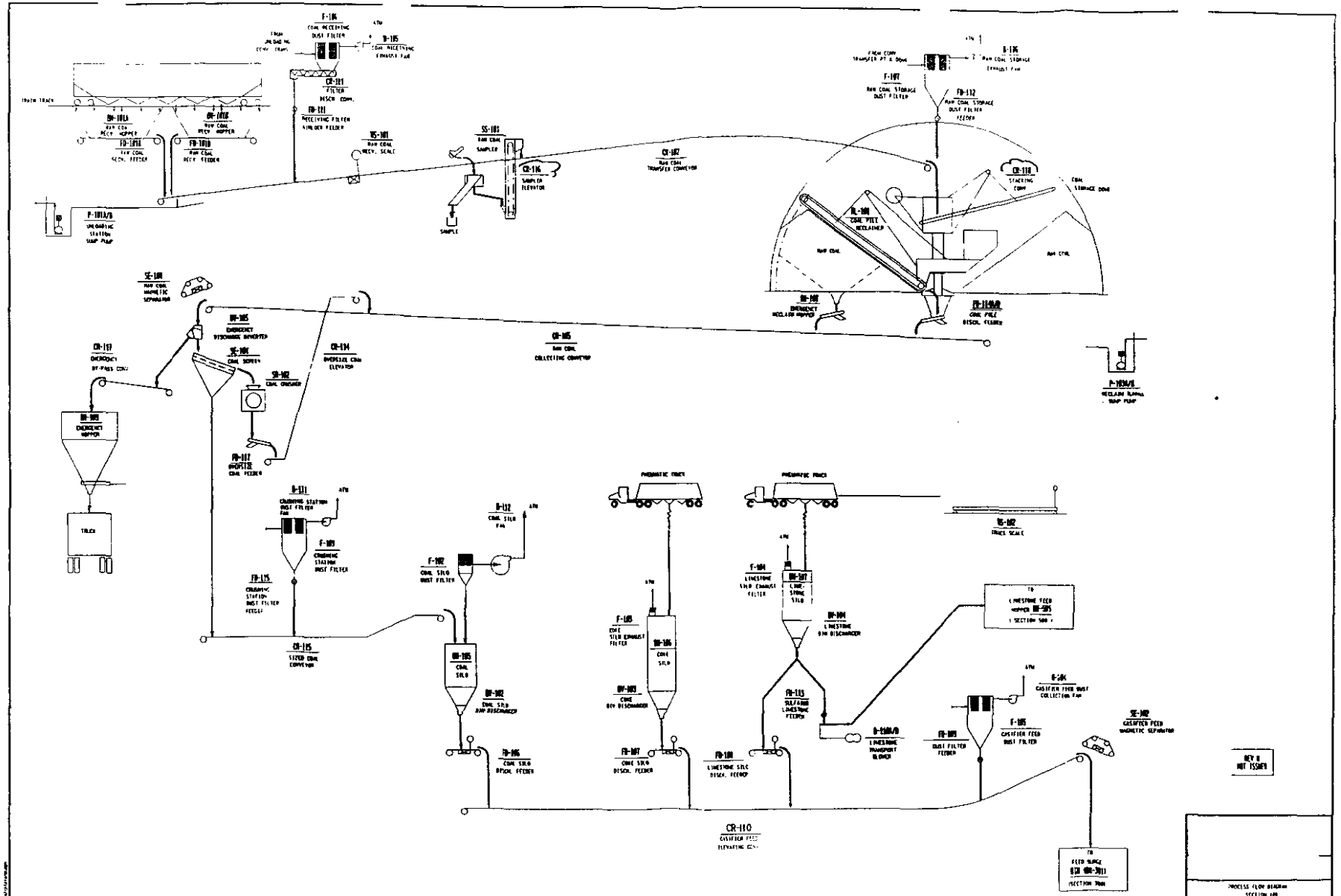
- MATERIAL BALANCE FLOW STREAM NUMBER
- TEMPERATURE, °F
- PRESSURE, PSIA, UNLESS OTHERWISE NOTED
- FLOW STREAM TO BATTERY LIMITS
- FLOW STREAM FROM BATTERY LIMITS

PROCESS FLOW DIAGRAM
SECTION 800
DEAERATOR HEATER & BLOWDOWN DRUMS
TRACY POWER STATION - UNIT NO. 4
PINON PINE POWER PROJECT RENO, NEVADA

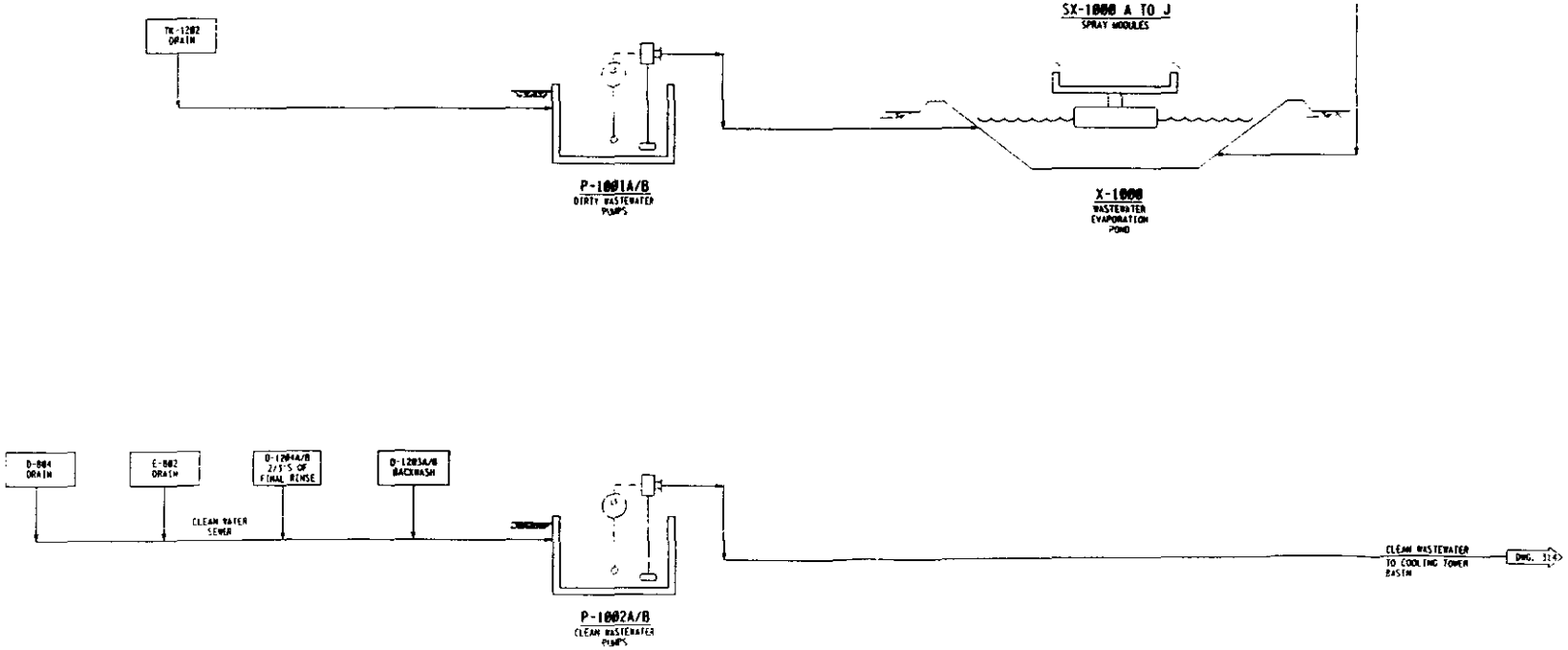
DRAWN BY:		SCALE: NONE	REV
CHK'D BY:		CONTRACT NO.: 15-4142	0
APP'D BY:		DRAWING NO.: 4142-2-50-2	

REVISIONS

0 ISSUED FOR CLIENT REVIEW 11/12/93 | FOR CLASSIFICATION 7/15/93 | PRELIMINARY ISSUE



NO.	REVISIONS	BY	DATE
G	VALUE ENG. CL III est.		5-5-94
F	FOR CLIENT REVIEW		2-25-94
E	FOR CLASS III ESTIMATE		2-7-94
D	[illegible]		12-21-93
C	REVISED FOR ESTIMATE		12-09-93
B	FOR ESTIMATE		11-05-93
A	INITIAL ISSUE		07-09-93



NOTES

LEGEND

- MATERIAL BALANCE FLOW STREAM NUMBER
- TEMPERATURE, °F
- PRESSURE, PSIA, UNLESS OTHERWISE NOTED
- FLOW STREAM TO BATTERY LIMITS
- FLOW STREAM FROM BATTERY LIMITS

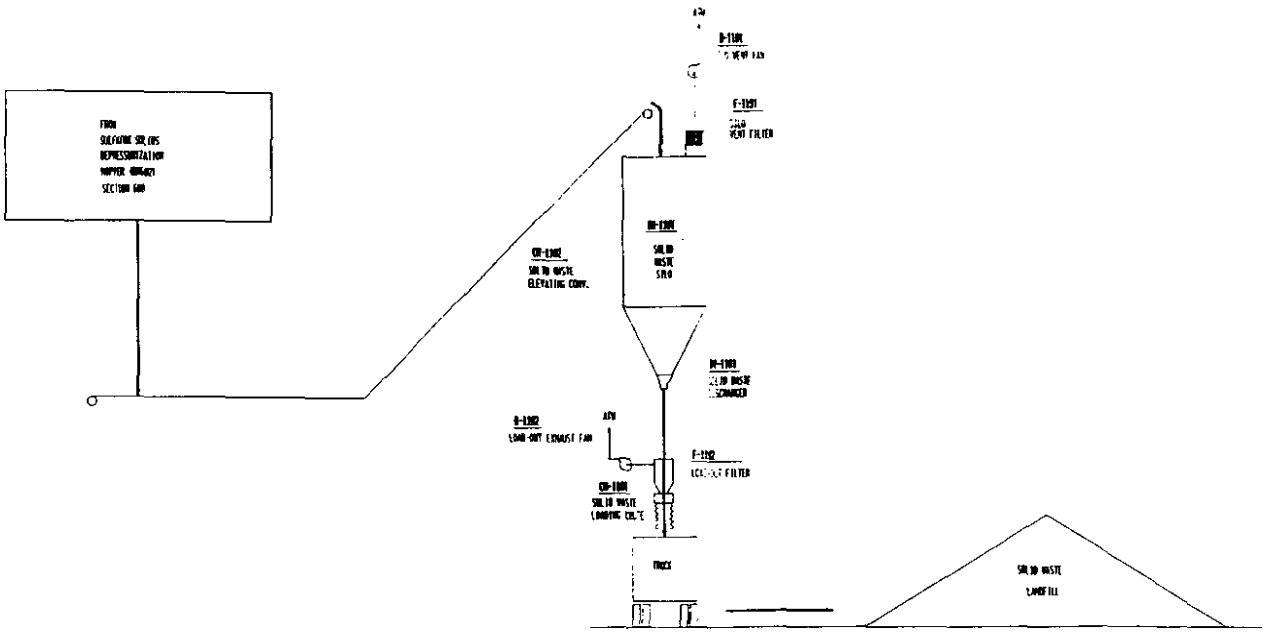
PROCESS FLOW DIAGRAM
SECTION 1000
WASTEWATER TREATMENT
TRACY POWER STATION UNIT NO. 4
PINON PINE POWER PROJECT RENO, NEVADA

DRAWN BY:	JBM	1-22-93	SCALE: NONE
CHK'D BY:			CONTRACT NO.: 15-4143
APP'D BY:			DRAWING NO. 4143-2-50-311

REV. C

REVISIONS

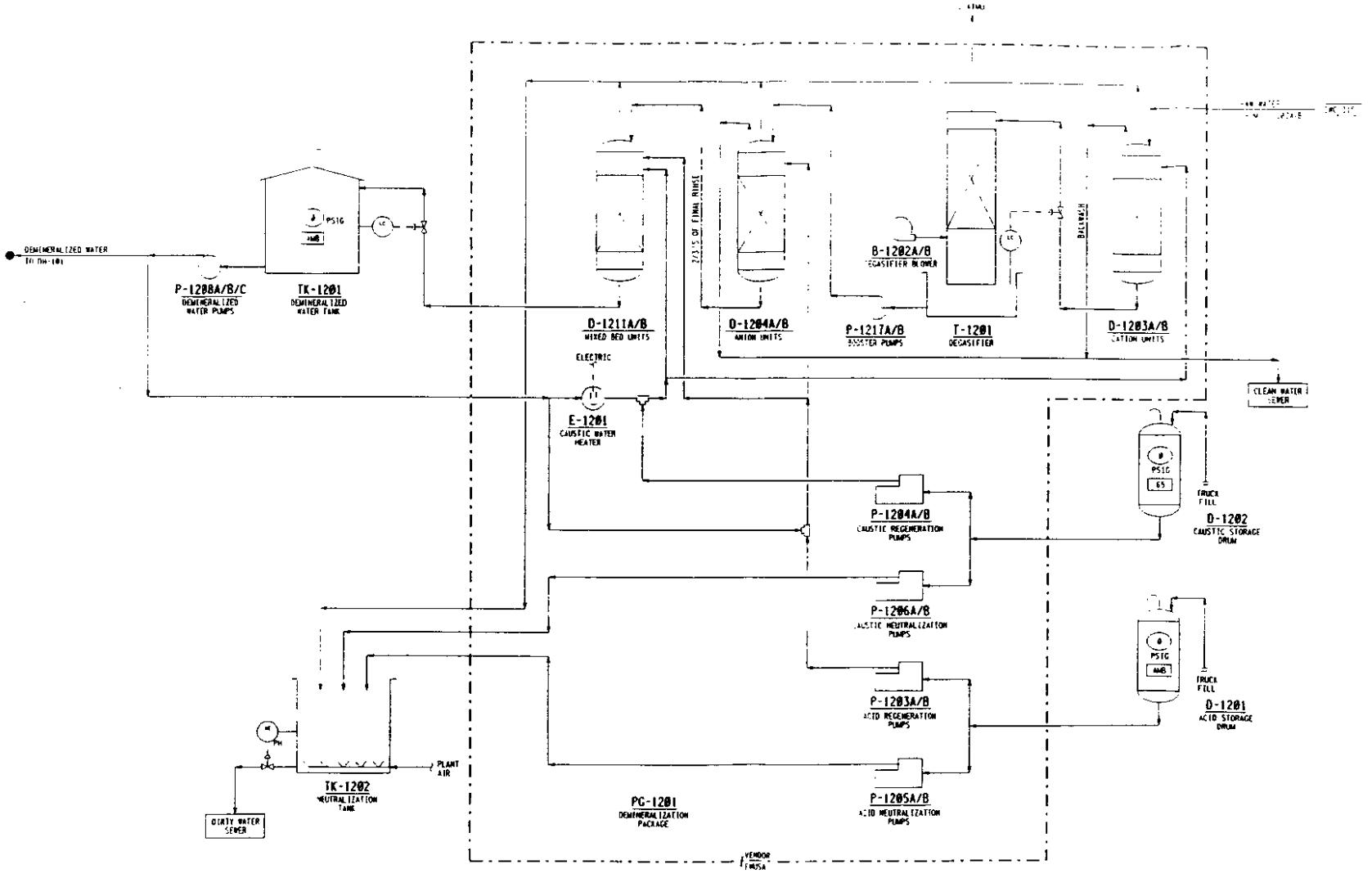
	2/25/94	FOR CLIENT REVIEW
B	11-12-93	FOR CLASS II EST.
A	7/15/93	PRELIM. ISSUE



PROCESS FLOW DIAGRAM
SECTION 1100
SOLID WASTE HANDLING SYSTEM
HIGH FINE POWER PROJECT

DRAWN BY		SCALE	REV.
CHK'D BY		CONTRACT NO.	0
APP'D BY		DRAWING NO.	

A	07-09-93	INITIAL ISSUE	
	8-11-93	FOR ESTIMATE	
	2-25-94	FOR CLIENT REVIEW	



NOTES

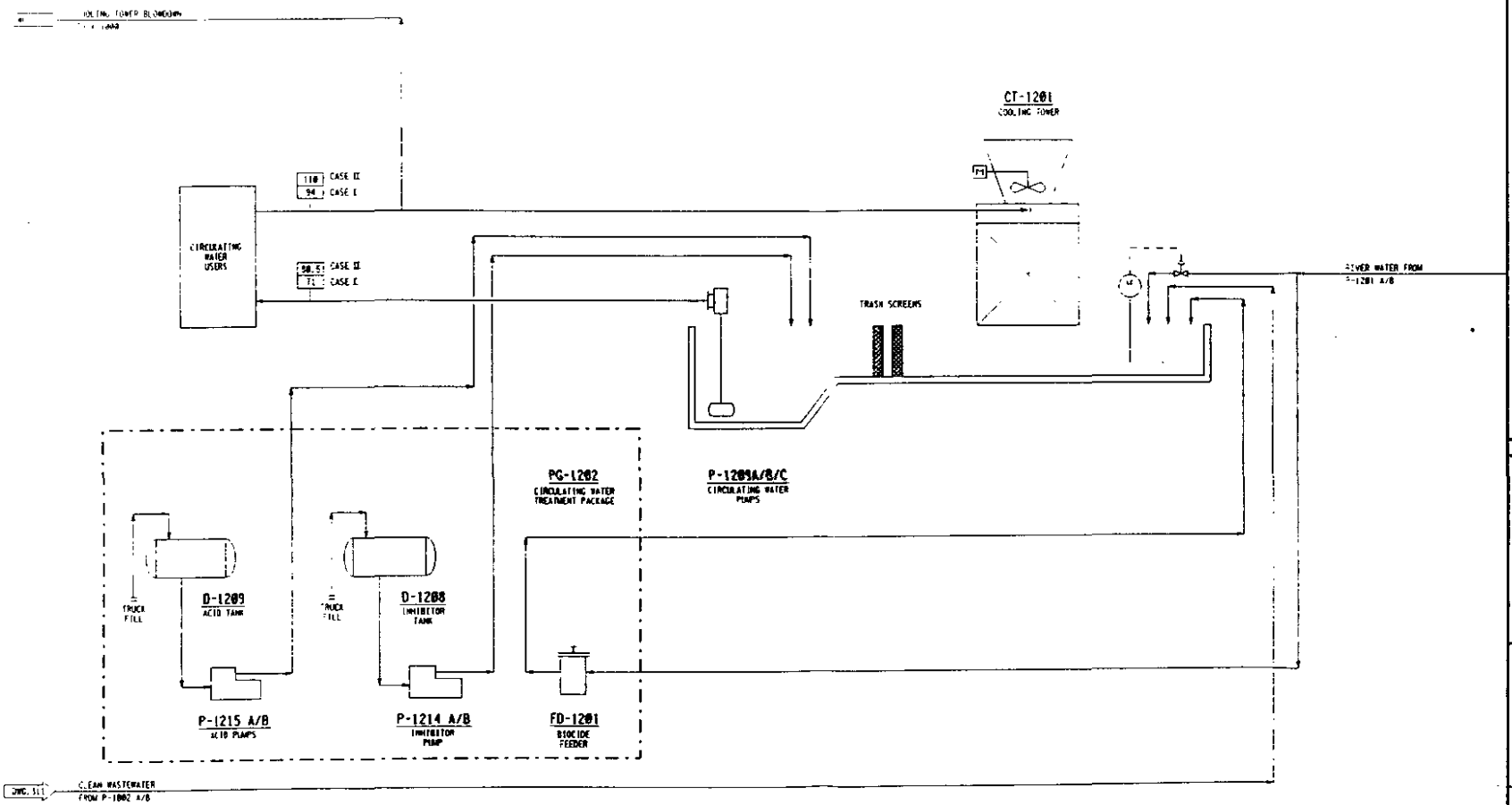
LEGEND

- MATERIAL BALANCE FLOW STREAM NUMBER
- TEMPERATURE, °F
- PRESSURE, PSIA, UNLESS OTHERWISE NOTED
- FLOW STREAM TO BATTERY LIMITS
- FLOW STREAM FROM BATTERY LIMITS

PROCESS FLOW DIAGRAM
SECTION 1200
BOILER FEEDWATER TREATMENT
TRACY POWER STATION - UNIT NO. 4
PINON PINE POWER PROJECT RENO, NEVADA

DRAWN BY:	JMH	1-JUL 95	SCALE: NONE	REV
CHK'D BY:			CONTRACT NO.: 15-4143	C
APP'D BY:			DRAWING NO.: 4143-2-50-313	

REVISIONS	
C	2/25/94 - FOR CLIENT REVIEW
B	11/12/93 - FOR CLASS III EST.
A	10/15/93 - PRELIM. ISSUE



NOTES

LEGEND

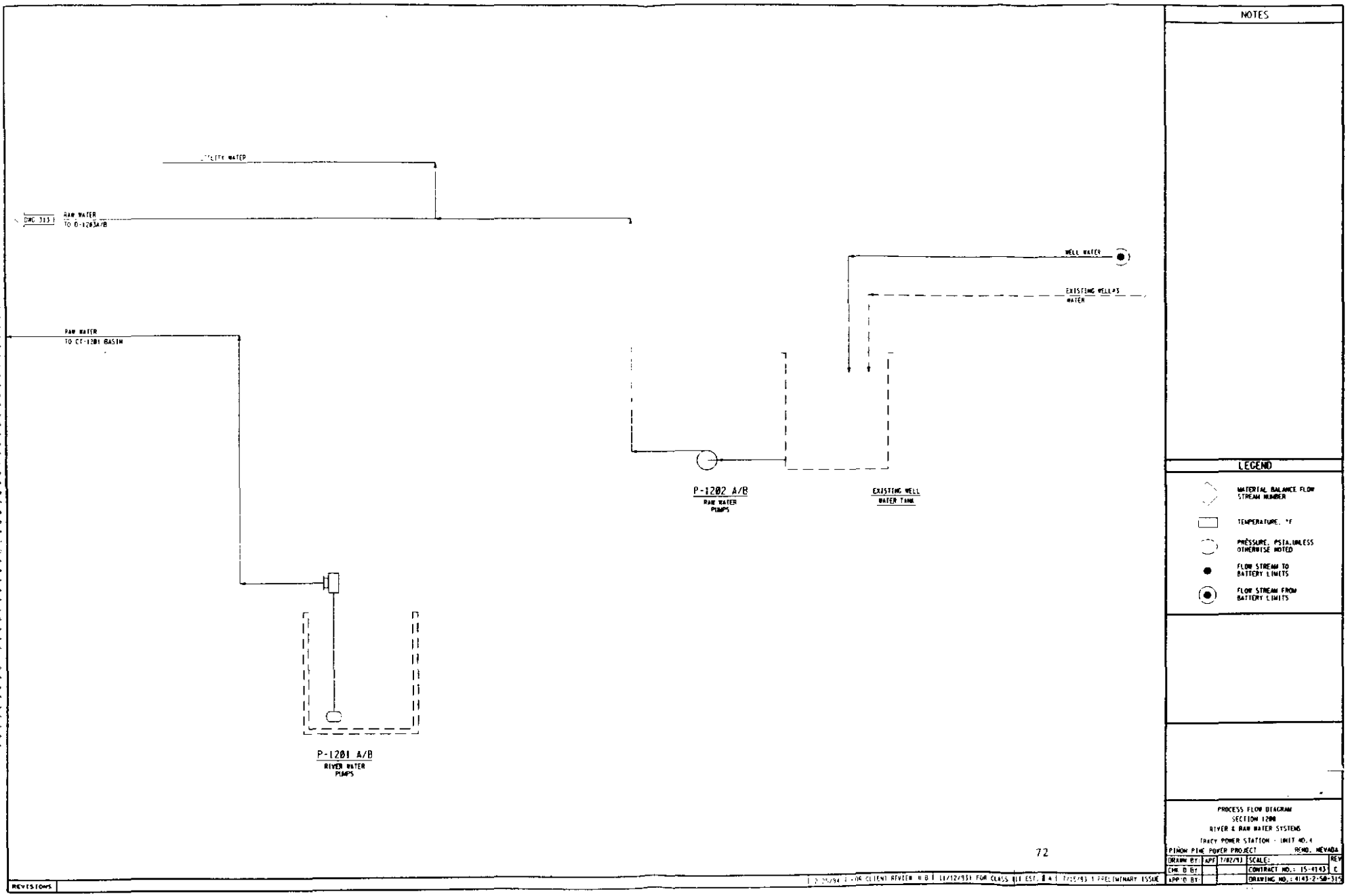
- MATERIAL BALANCE FLOW STREAM NUMBER
- TEMPERATURE, °F
- PRESSURE, PSIA, UNLESS OTHERWISE NOTED
- FLOW STREAM TO BATTERY LIMITS
- FLOW STREAM FROM BATTERY LIMITS

PROCESS FLOW DIAGRAM
SECTION 1200
COOLING WATER SYSTEM
TRACY POWER STATION - UNIT NO. 4

PINON PINE POWER PROJECT			RENO, NEVADA
DRAWN BY:		SCALE: NONE	REV
CHK'D BY:		CONTRACT NO.: 15-4143	C
APP'D BY:		DRAWING NO.: 4143-2-50-31	

REVISIONS

C	7/25/94	FOR CLIENT REVIEW
B	11/15/93	FOR CLASS III EST.
A	7/15/93	PRELIMINARY ISSUE



NOTES

LEGEND

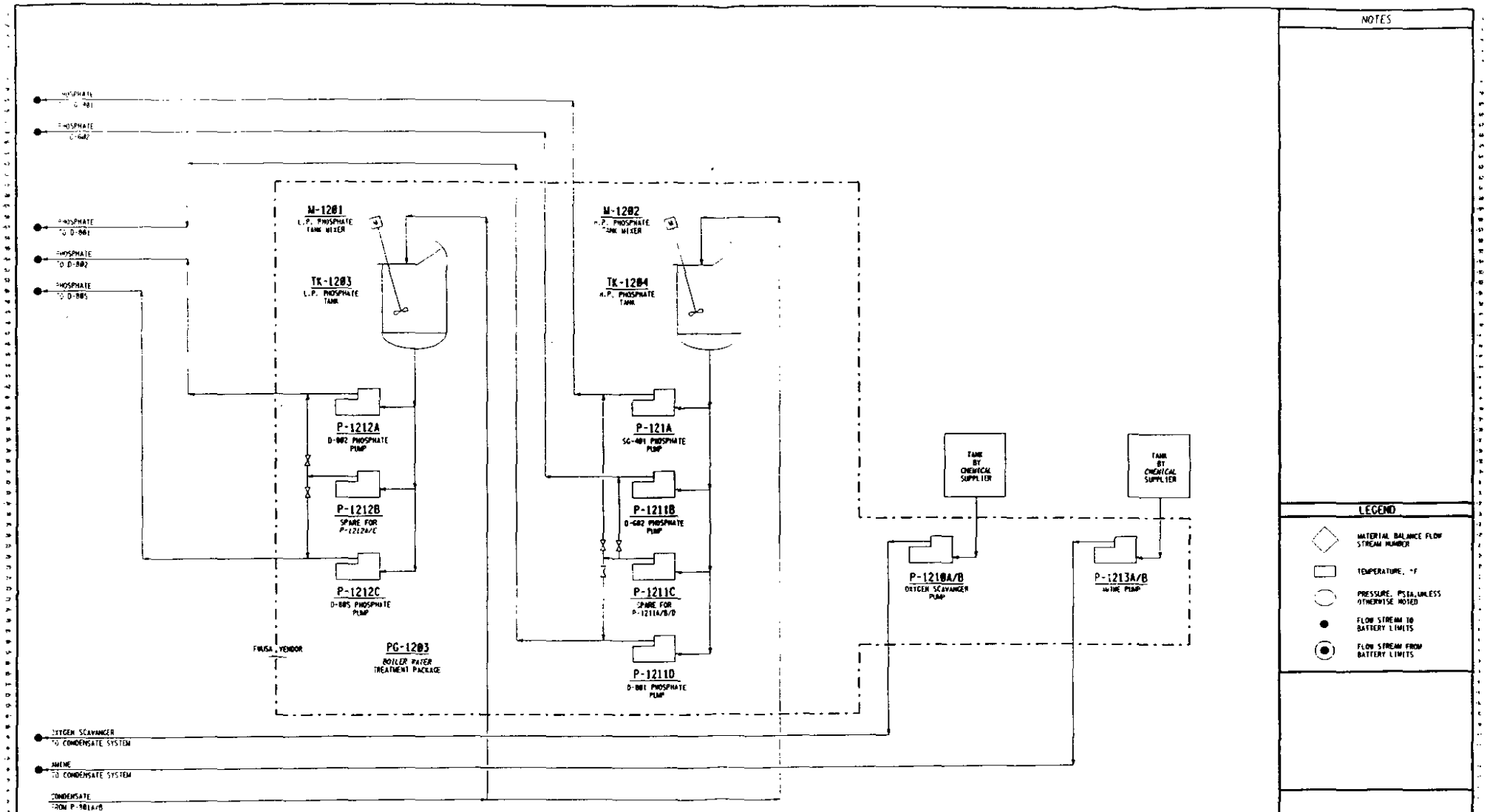
- MATERIAL BALANCE FLOW STREAM NUMBER
- TEMPERATURE, °F
- PRESSURE, PSIA, UNLESS OTHERWISE NOTED
- FLOW STREAM TO BATTERY LIMITS
- FLOW STREAM FROM BATTERY LIMITS

PROCESS FLOW DIAGRAM
SECTION 1200
RIVER & RAW WATER SYSTEMS
TRACY POWER STATION - UNIT NO. 4
PINON PINE POWER PROJECT RENO, NEVADA

DRAWN BY:	APF	7/02/93	SCALE:	REV
CHK'D BY:			CONTRACT NO.: 15-4143	C
APP'D BY:			DRAWING NO.: 4143-2-50-315	

REVISIONS

2	7/25/94	I-ON CLIENT REVIEW W/ D
1	12/12/93	FOR CLASS III EST.
A	7/23/93	PRELIMINARY ISSUE



NOTES

LEGEND

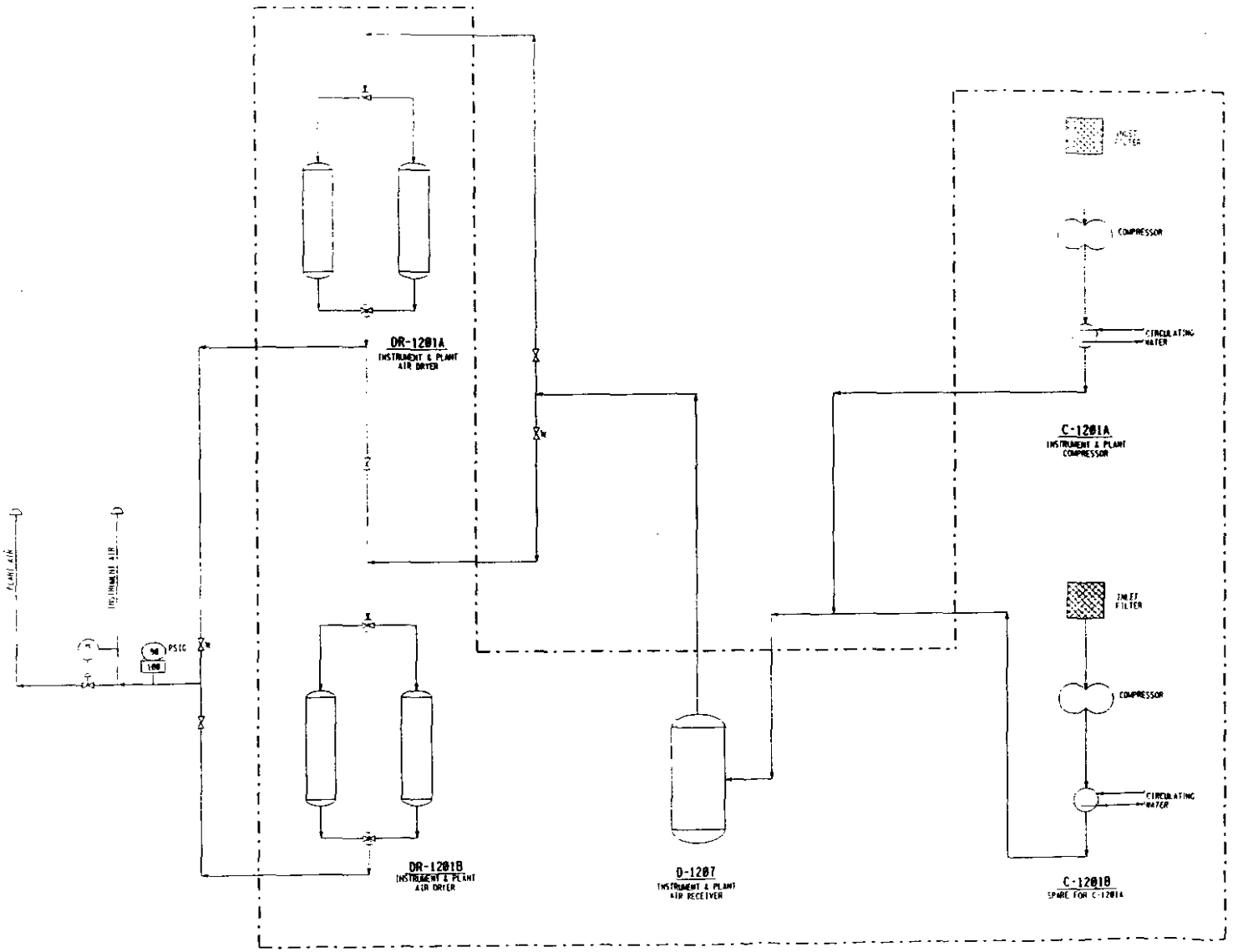
- MATERIAL BALANCE FLOW STREAM NUMBER
- TEMPERATURE, °F
- PRESSURE, PSIA, UNLESS OTHERWISE NOTED
- FLOW STREAM TO BATTERY LIMITS
- FLOW STREAM FROM BATTERY LIMITS

PROCESS FLOW DIAGRAM
SECTION 1200
BOILER WATER TREATMENT
TRACY POWER STATION - UNIT NO. 4
PINON PINE POWER PROJECT RENO, NEVADA

DRAWN BY:	C.C	SCALE:	NONE
CHK'D BY:		CONTRACT NO.:	15-4143
APP'D BY		DRAWING NO.:	4143-2-50-316

REVISIONS

C 12/25/91 FOR CLIENT REVIEW
B 11/12/91 FOR CLASS III EST.
A 7/15/91 PRELIM. ISSUE



NOTES

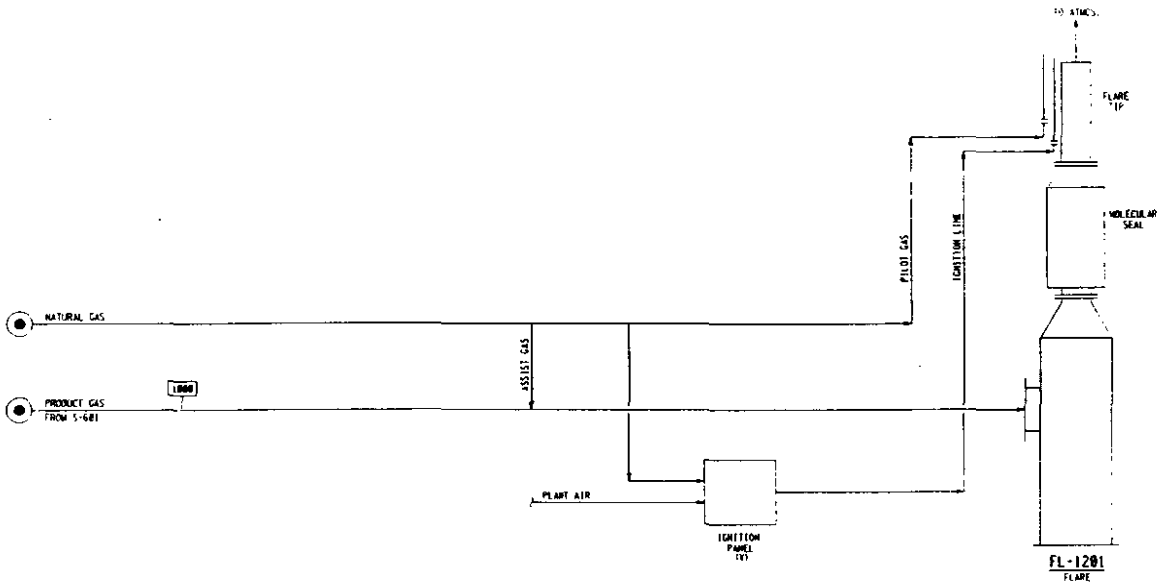
LEGEND

- MATERIAL BALANCE FLOW STREAM NUMBER
- TEMPERATURE, °F
- PRESSURE, PSIA, UNLESS OTHERWISE NOTED
- FLOW STREAM TO BATTERY LIMITS
- FLOW STREAM FROM BATTERY LIMITS

PROCESS FLOW DIAGRAM
SECTION 1200
INSTRUMENT & PLANT AIR SYSTEM
TRACY POWER STATION - UNIT NO. 4
PINON PINE POWER PROJECT RENO, NEVADA

DRAWN BY		SCALE: NONE	REV
CHK'D BY		CONTRACT NO.: 15-4143	C
APP'D BY		DRAWING NO.: 4143-2-50-317	

REVISIONS						
IIC	2/25/93	FOR CLIENT REVIEW	IIC	11/12/93	FOR CLASS III EST.	A 7/15/93 PRELIM. ISSUE



NOTES

LEGEND

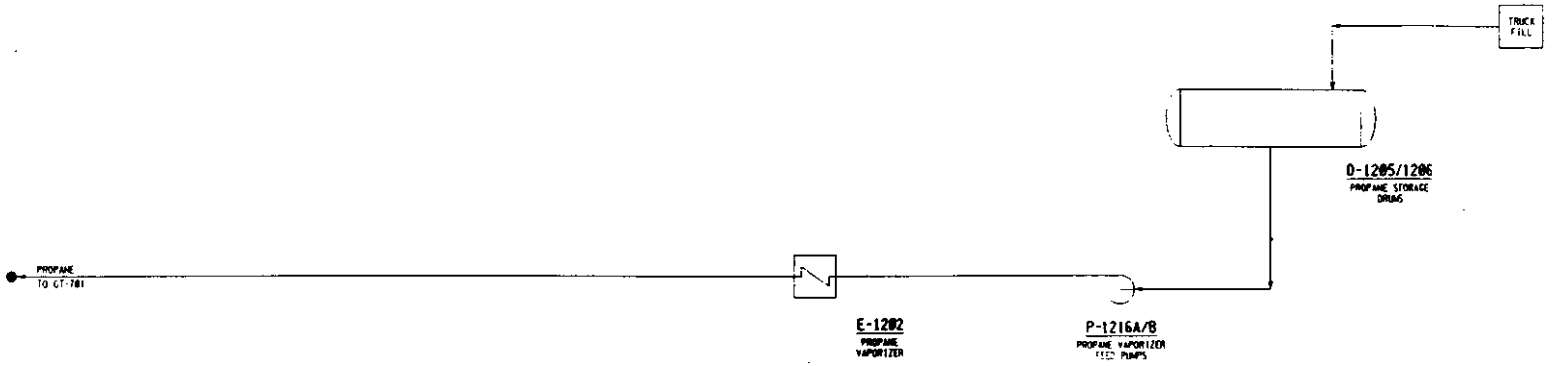
- MATERIAL BALANCE FLOW STREAM NUMBER
- TEMPERATURE, °F
- PRESSURE, PSIA, UNLESS OTHERWISE NOTED
- FLOW STREAM TO BATTERY LIMITS
- FLOW STREAM FROM BATTERY LIMITS

PROCESS FLOW DIAGRAM
SECTION 1200
FLARE SYSTEM
TRACY POWER STATION - UNIT NO. 4
PINON PINE POWER PROJECT RENO, NEVADA

DRAWN BY:	C.C	SCALE: NONE	REV
CHK'D BY:		CONTRACT NO.: 15-4143	C
APP'D BY:		DRAWING NO.: 4143-2-50-31B	

REVISIONS

C	2/25/94	FOR CLIENT REVIEW
B	11/12/93	FOR CLASS III EST.
A	7/15/93	PRELIM. ISSUE



NOTES

LEGEND

- MATERIAL BALANCE FLOW STREAM NUMBER
- TEMPERATURE, °F
- PRESSURE, PSIA UNLESS OTHERWISE NOTED
- FLOW STREAM TO BATTERY LIMITS
- FLOW STREAM FROM BATTERY LIMITS

PROCESS FLOW DIAGRAM
SECTION 1200
PROPANE SYSTEM
TRACY POWER STATION - UNIT NO. 4
PENON PINE POWER PROJECT RENO, NEVADA

DRAWN BY:	C.C.	SCALE: NONE	REV
CHK'D BY:		CONTRACT NO.: 15-4143	C
APP'D BY:		DRAWING NO.: 4143-2-50-319	

REVISIONS

C	2/25/94	FOR CLIENT REVIEW	B	11/12/93	FOR CLASS III EST.	A	7/15/93	PRELIM. ISSUE
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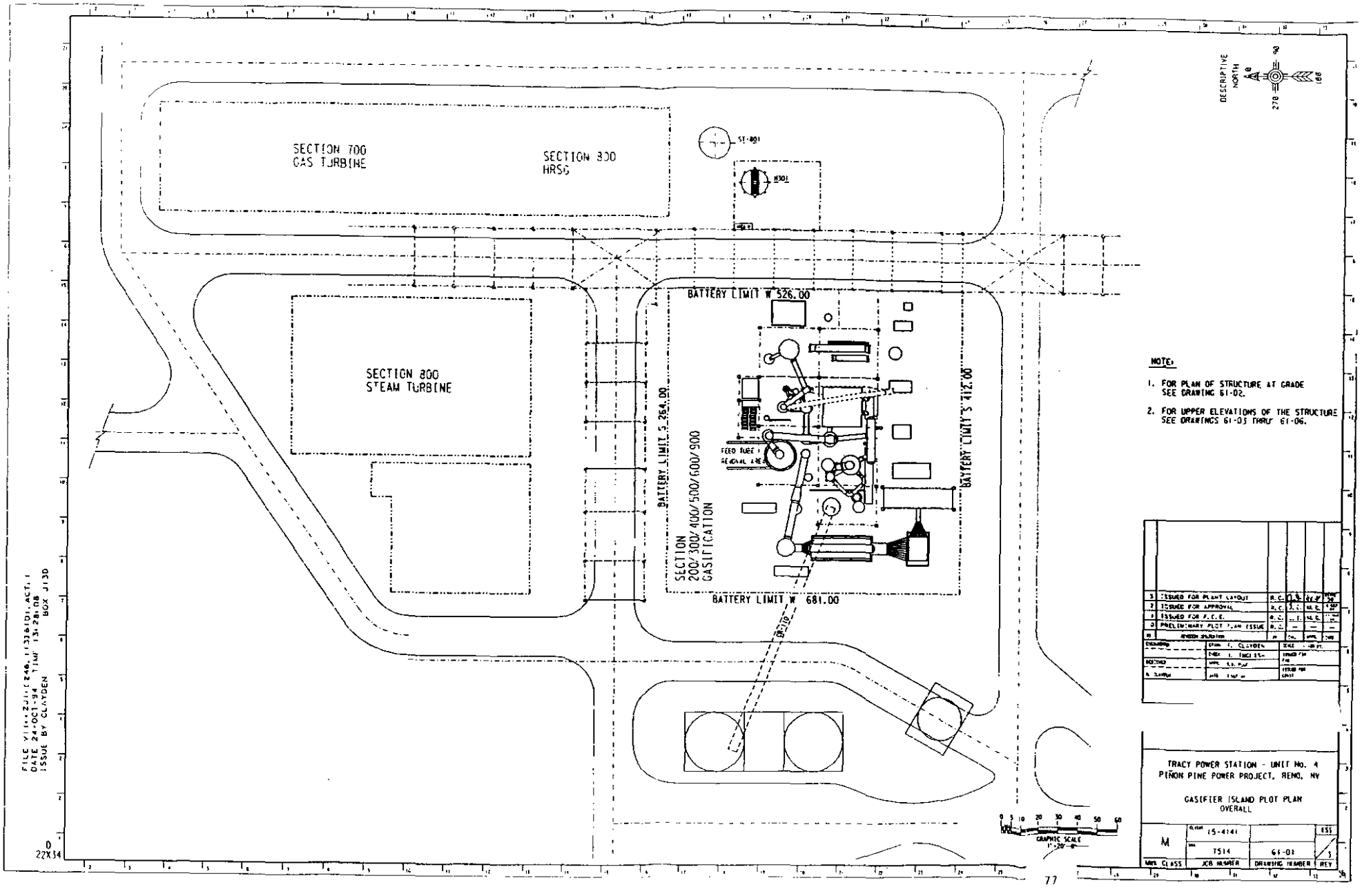
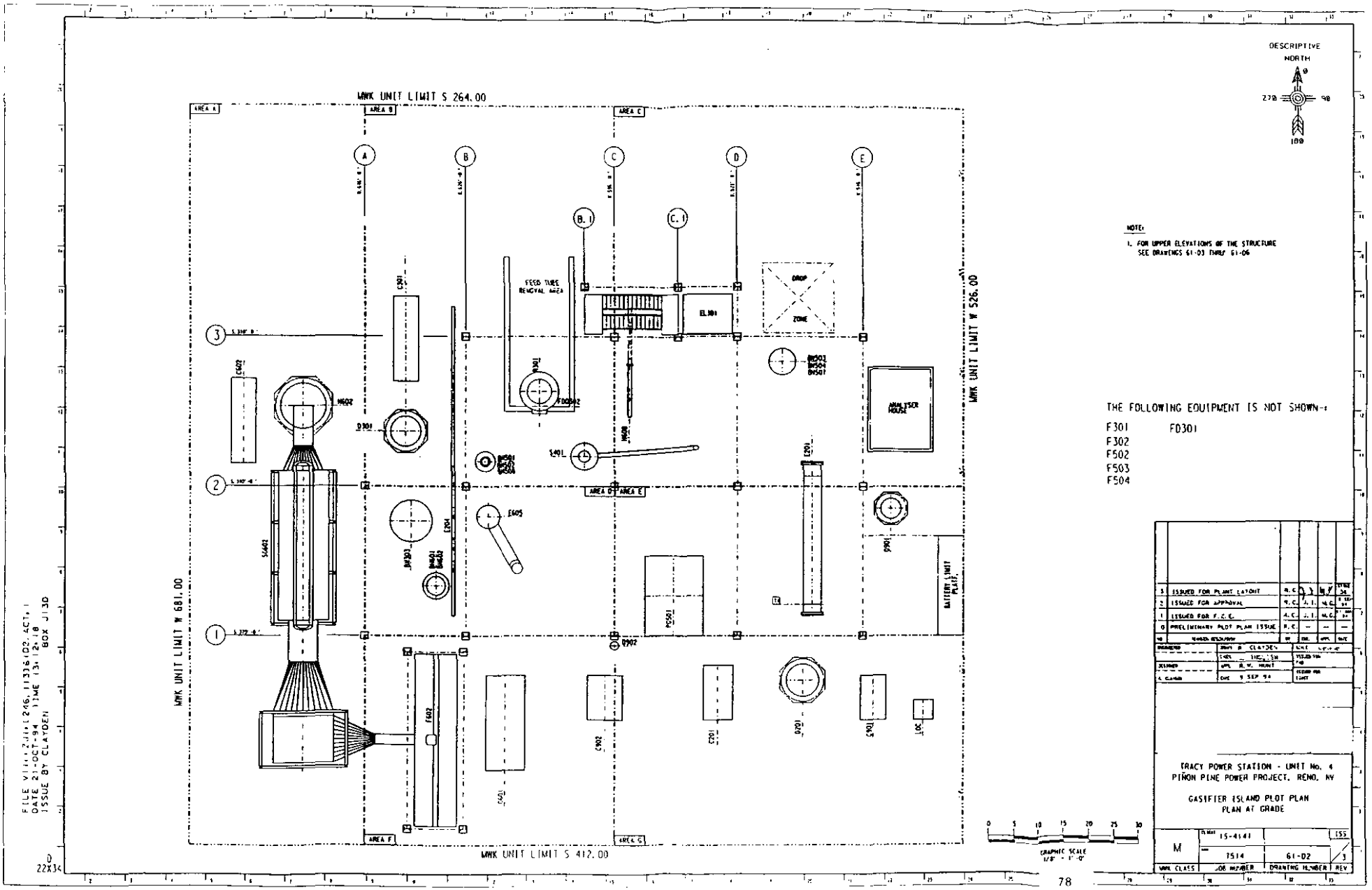
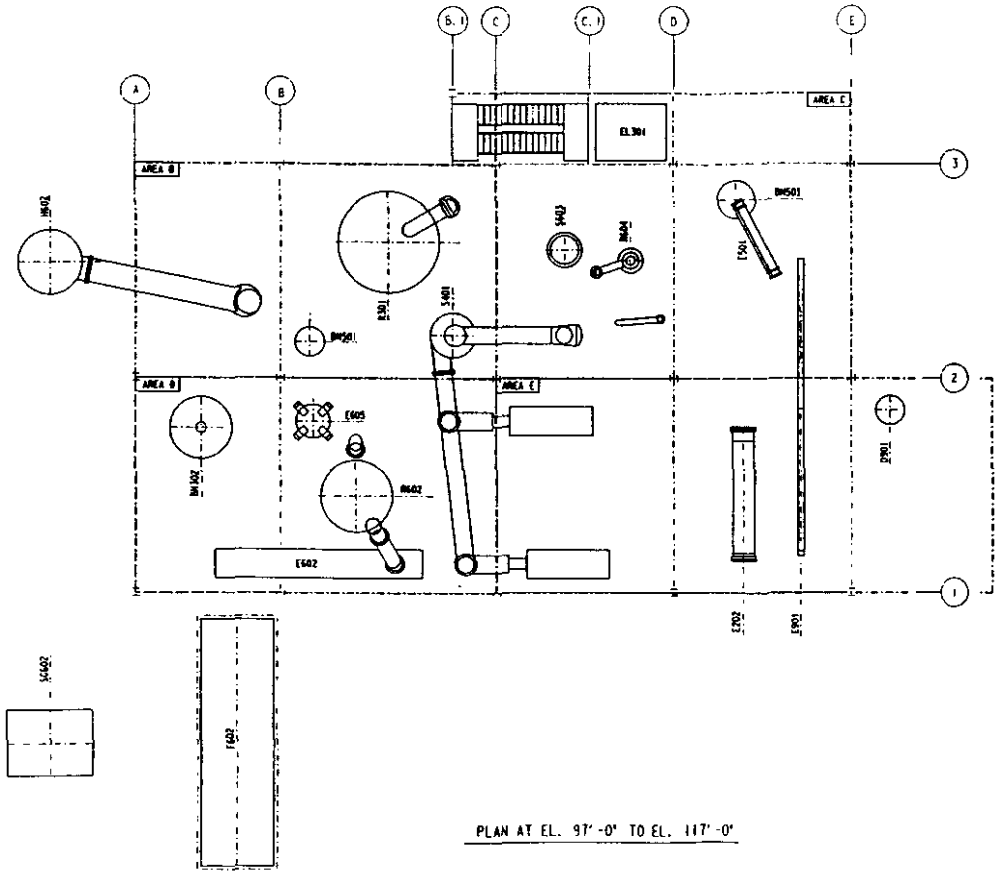

SECTION 700
GAS TURBINE
SECTION 800
HRSG
SECTION 800
STEAM TURBINE
BATTERY LIMIT W 526.00
BATTERY LIMIT S 264.00
BATTERY LIMIT E 412.00
BATTERY LIMIT W 681.00
SECTION
200/300/400/500/600/900
GASIFICATION
DESCRIPTIVE NORTH
NOTE:
1. FOR PLAN OF STRUCTURE AT GRADE SEE DRAWING 61-02.
2. FOR UPPER ELEVATIONS OF THE STRUCTURE SEE DRAWINGS 61-03 THRU 61-06.
TRACY POWER STATION - UNIT NO. 4
PIÑON PINE POWER PROJECT, RENO, NV
GASIFIER ISLAND PLOT PLAN
OVERALL
15-4141
7514
61-02
GRAPHIC SCALE


MWK UNIT LIMIT S 264.00
MWK UNIT LIMIT W 681.00
MWK UNIT LIMIT W 526.00
MWK UNIT LIMIT S 412.00
AREA A
AREA B
AREA C
AREA D
AREA E
AREA F
AREA G
DESCRIPTIVE NORTH
NOTE:
1. FOR UPPER ELEVATIONS OF THE STRUCTURE SEE DRAWINGS 61-03 THRU 61-06
THE FOLLOWING EQUIPMENT IS NOT SHOWN-:
F301
F302
F502
F503
F504
FD301
TRACY POWER STATION - UNIT No. 4
PIÑON PINE POWER PROJECT, RENO, NV
GASIFIER ISLAND PLOT PLAN
PLAN AT GRADE
15-4141
7514
61-02
GRAPHIC SCALE



PLAN AT EL. 97'-0" TO EL. 117'-0"

DESCRIPTIVE NORTH

0 90 180 270

NOTE:
1. FOR LOWER ELEVATIONS SEE DRAWING 61-02
2. FOR UPPER ELEVATIONS SEE DRAWINGS 61-04 THRU 61-06

3	ISSUED FOR PLANT LAYOUT REDRAWN - PLAN AT EL 117'-0" MOVED TO DRG. 61-04	R.C.			
2	ISSUED FOR APPROVAL	R.C.			
1	ISSUED FOR C.C.E.	R.C.			
0	PRELIMINARY PLOT PLAN ISSUE	R.C.			

TRACY POWER STATION - UNIT No. 4
PIÑON PINE POWER PROJECT, RENO, NV

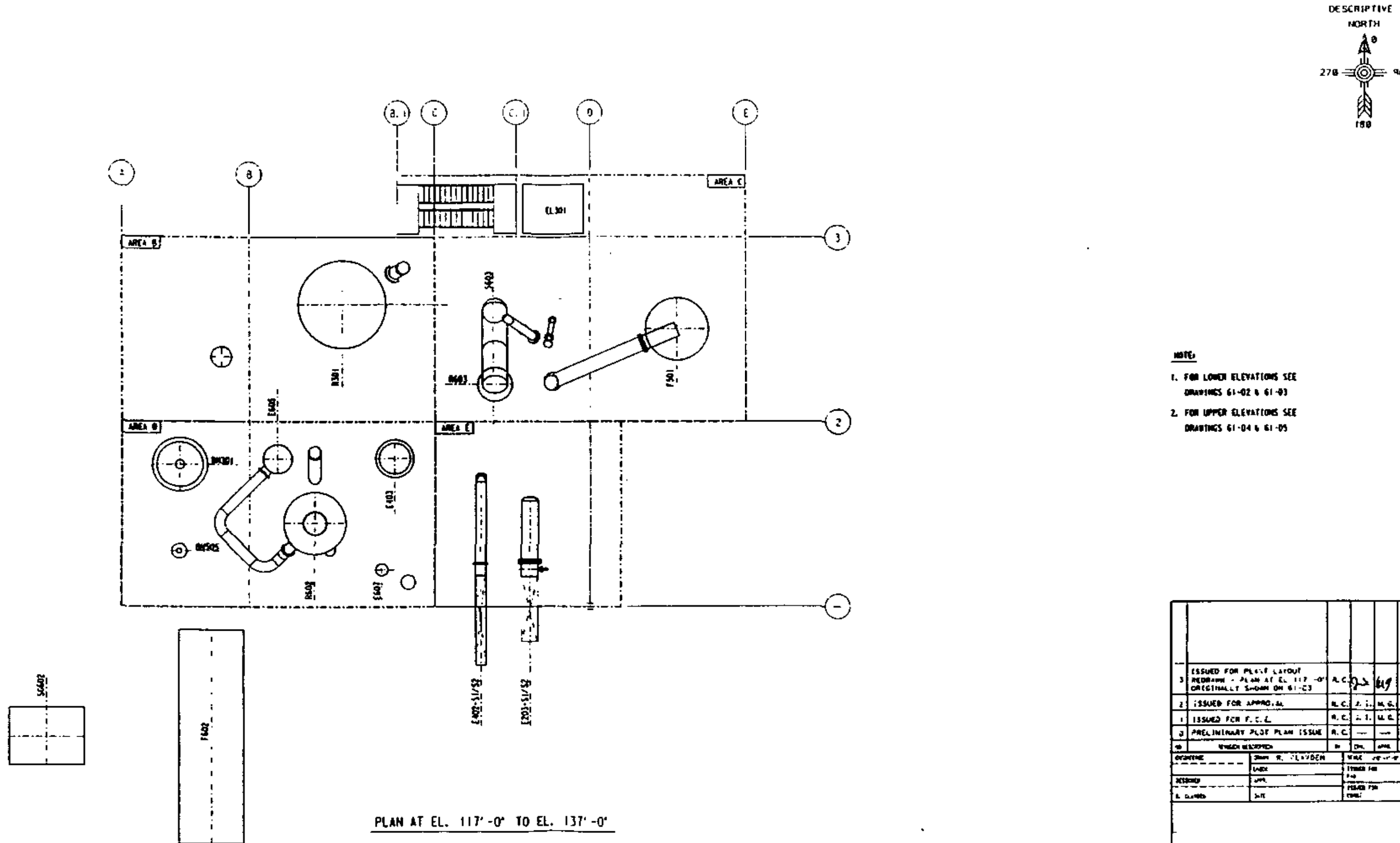
GASIFIER ISLAND PLOT PLAN
PLAN AT EL. 97'-0" TO EL. 117'-0"

M	7514	61-03	3
WBS CLASS	JOB NUMBER	DRAWING NUMBER	REV

GRAPHIC SCALE 1/8" = 1'-0"

0 5 10 15 20 25 30

0 22X34



PLAN AT EL. 117'-0" TO EL. 137'-0"

NOTE:

1. FOR LOWER ELEVATIONS SEE DRAWINGS 61-02 & 61-03
2. FOR UPPER ELEVATIONS SEE DRAWINGS 61-04 & 61-05

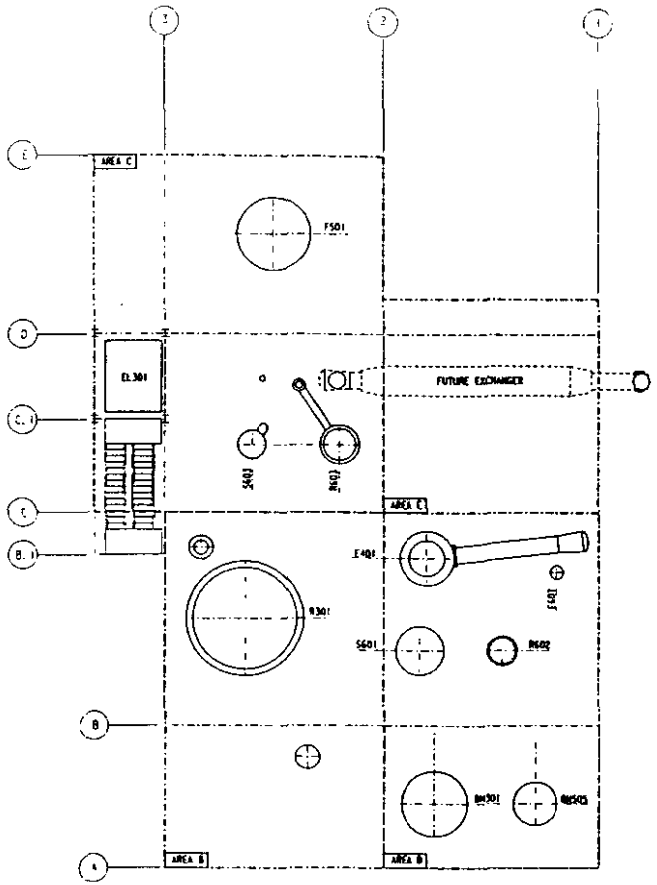
3	ISSUED FOR PLANT LAYOUT REDRAWN - PLAN AT EL. 117'-0" ORIGINALLY SHOWN ON 61-C3	A.C.			94
2	ISSUED FOR APPROVAL	A.C.		M.G.	
1	ISSUED FOR F.C.E.	A.C.		M.G.	
0	PRELIMINARY PLOT PLAN ISSUE	A.C.	—	—	—

TRACY POWER STATION - UNIT No. 4
PIÑON PINE POWER PROJECT, RENO, NV

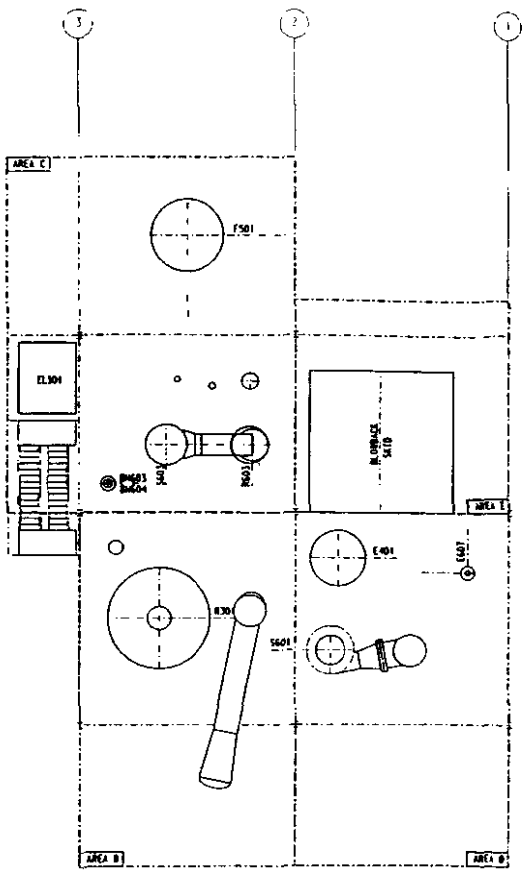
GASIFIER ISLAND PLOT PLAN
PLAN AT EL. 117'-0" TO EL. 137'-0"

WBK CLASS	JOB NUMBER	DRAWING NUMBER	REV
M	15-4141 / 7514	61-04	3

GRAPHIC SCALE 1/8" = 1'-0"



PLAN AT EL. 137'-0" TO EL. 157'-0"



PLAN AT EL. 157'-0" TO EL. 177'-0"

NOTES:

1. FOR LOWER ELEVATIONS SEE DRAWINGS 61-02 THRU 61-04.
2. FOR UPPER ELEVATIONS SEE DRAWING 61-06.

3	ISSUED FOR PLANT LAYOUT REDRAWN - PLANS ORIGINALLY SHOWN ON DWG. 61-04	R.C.	J.I.	M.C.	10 MAY 94
2	ISSUED FOR APPROVAL	R.C.	J.I.	M.C.	21 OCT 94
1	ISSUED FOR P.C.E.	R.C.	J.I.	M.C.	11 JUL 94
0	PRELIMINARY PLOT PLAN ISSUE	R.C.	—	—	—
NO.	REVISION DESCRIPTION	BY	CHK.	APPD.	DATE

DESIGNED: R. CLAYDEN
DRAWN: R. CLAYDEN
CHK'D: J. ENGLISH
APPD.:
DATE:
SCALE: 1/8" = 1'-0"
ISSUED FOR P.C.E.
ISSUED FOR CONST.

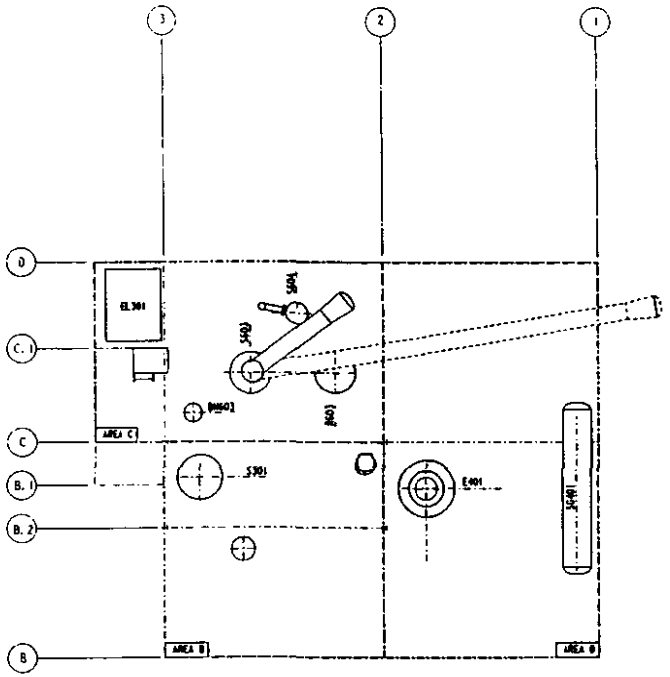
TRACY POWER STATION - UNIT No. 4
PIÑON PINE POWER PROJECT, RENO, NV

GASIFIER ISLAND PLOT PLAN
PLAN AT EL. 137'-0" TO EL. 177'-0"

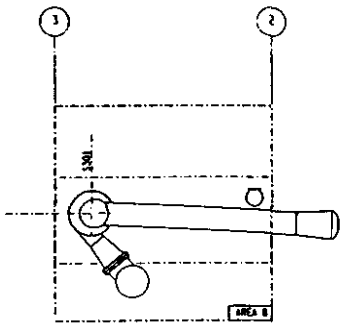
M	15-4141		155
	1514	61-05	3
WBS CLASS	JOB NUMBER	DRAWING NUMBER	REV

GRAPHIC SCALE 1/8" = 1'-0"

22X34



PLAN AT EL. 177'-0" TO EL. 197'-0"



PLAN AT EL. 197'-0" AND ABOVE

DESCRIPTIVE NORTH

NOTES:

1. FOR LOWER ELEVATIONS SEE DRAWINGS 61-02 THRU 61-05.

3	ISSUED FOR PLANT LAYOUT REDRAWN - PLANS ORIGINALLY SHOWN ON DWG. 61-05	R.C.		
2	ISSUED FOR APPROVAL	R.C.	J.I.	M.C.
1	ISSUED FOR F.C.C.	R.C.	J.I.	M.C.
0	PRELIMINARY PLOT PLAN ISSUE	R.C.	—	—

DESIGNED JOHN R. CLAYDEN
CHECKED J. INGLISH
APPROVED
R. CLAYDEN

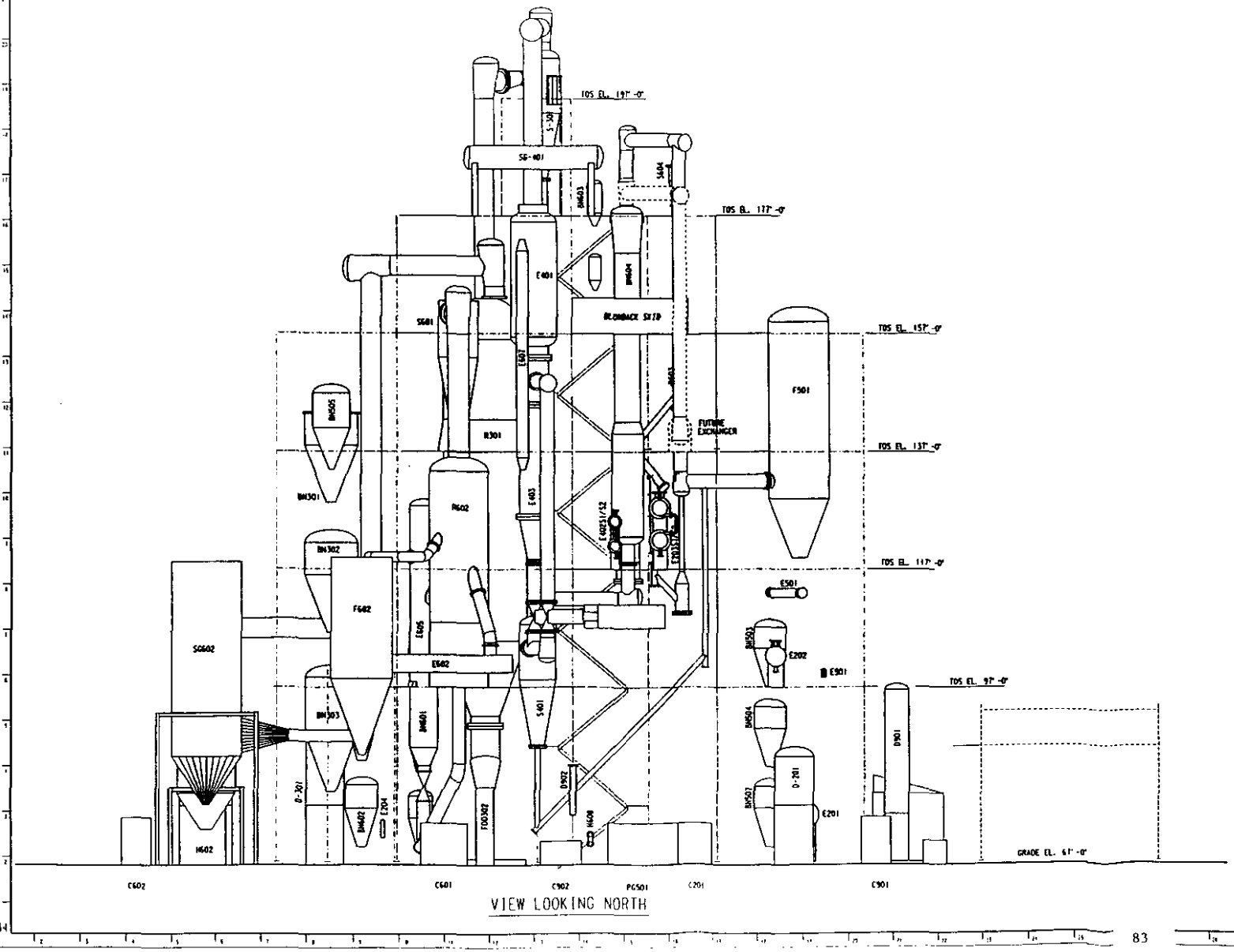
TRACY POWER STATION - UNIT No. 4
PIÑON PINE POWER PROJECT, RENO, NV

GASIFIER ISLAND PLOT PLAN
PLAN AT EL. 177'-0" AND ABOVE

M	15-4141		155
	7514	61-06	3
100% CLASS	JOB NUMBER	DRAWING NUMBER	REV

GRAPHIC SCALE 1/8" = 1'-0"

D
22X34



VIEW LOOKING NORTH

FILE V:\...\Z11(246,113)NORTH, ACT, 2
DATE 21-OCT-94 TIME 13:55:01
ISSUE BY CLAYDEN BOX J13U

0
22X34

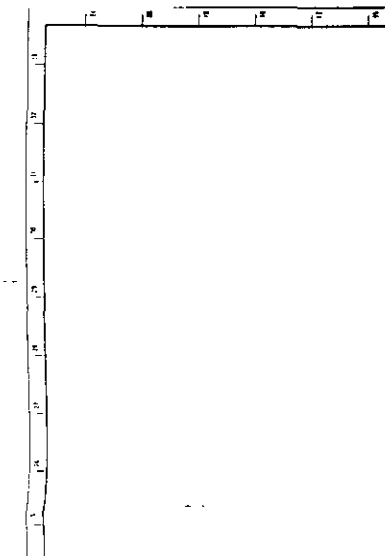
3	ISSUED FOR PLANT LAYOUT	R.C.			
2	ISSUED FOR APPROVAL	R.C.	J.E.	M.G.	
1	ISSUED FOR F.C.E.	R.C.	J.E.	M.G.	
0	PRELIMINARY PLOT PLAN ISSUE	R.C.	—	—	—
NO	REVISION DESCRIPTION	BY	CHK.	APPD.	DATE

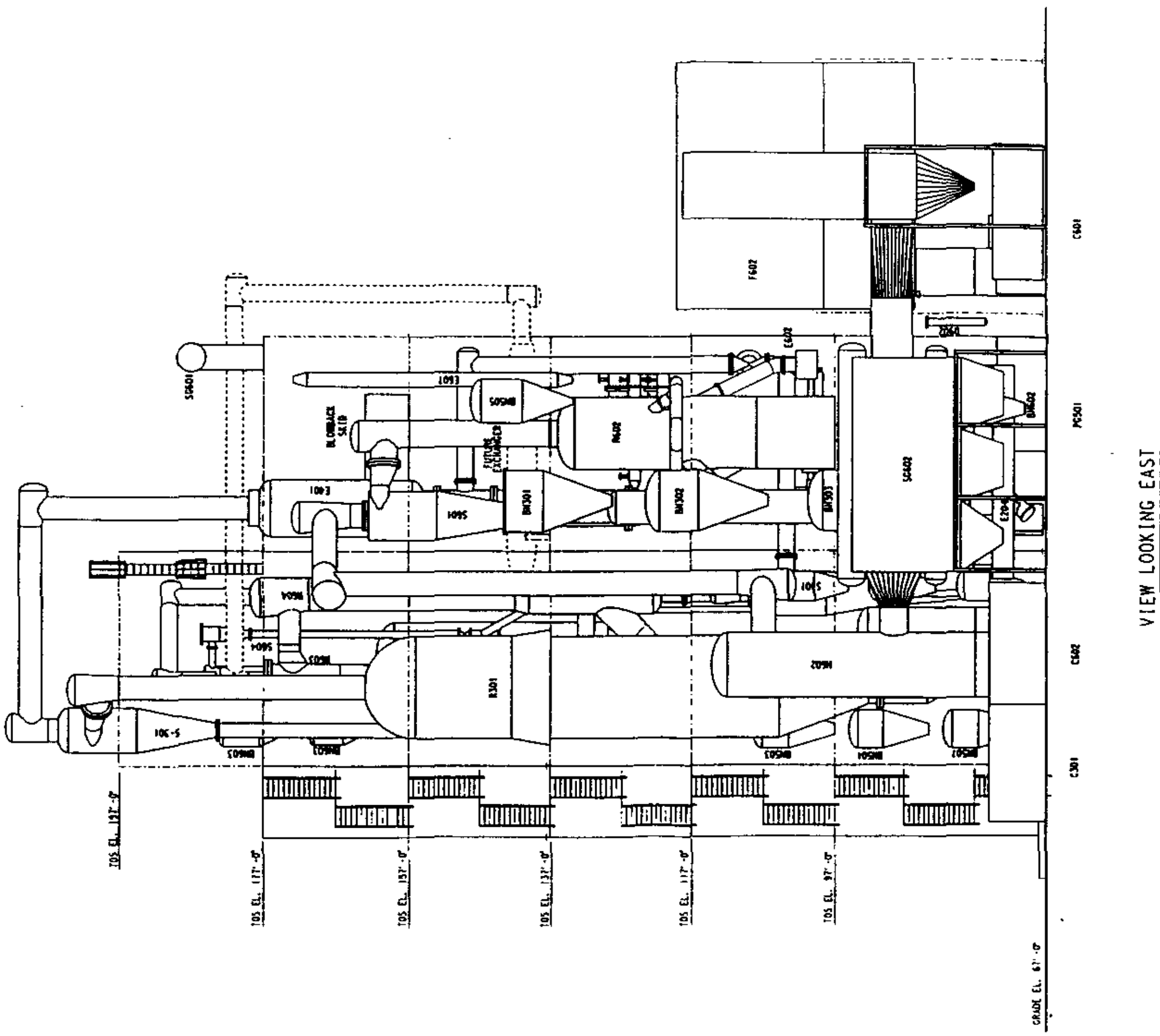
DESIGNED — DRAWN M. CLAYDEN — CHKD — ENGLISH — APPD — DATE 1 SEP 94 — SCALE — FILE NO. — ISSUED FOR — DRAWING NO.

TRACY POWER STATION - UNIT No. 4
PINON PINE POWER PROJECT, RENO, NV

GASIFIER ISLAND PLOT PLAN
SOUTH ELEVATION

M	CWM 15-4141		ISS
	1514	61-07	3
WBS CLASS	JOB NUMBER	DRAWING NUMBER	REV





3	ISSUED FOR PLANT LAYOUT			
2	ISSUED FOR APPROVAL	R.C.	J.E.	M.G.
1	ISSUED FOR F.C.E.	R.C.	J.E.	M.G.
0	PRELIMINARY PLOT PLAN ISSUE	R.C.	—	—

DRAWN R. CLAYDEN
CHKD J. ENGLISH

TRACY POWER STATION - UNIT No. 4
PIÑON PINE POWER PROJECT, RENO, NV

GASIFIER ISLAND PLOT PLAN
WEST ELEVATION

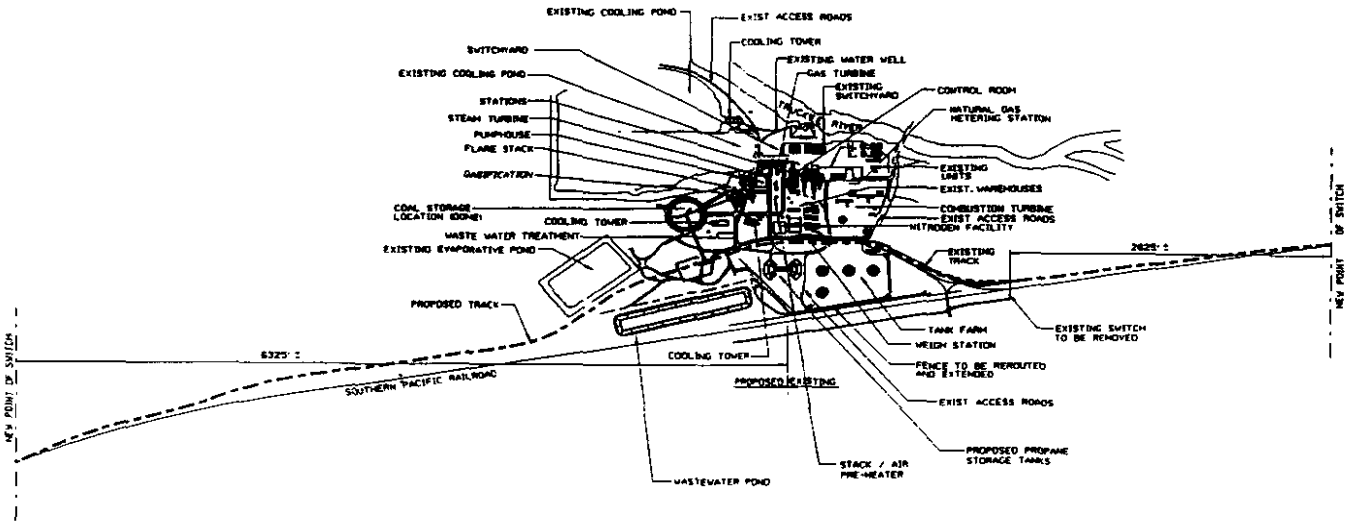
WORK CLASS	JOB NUMBER	DRAWING NUMBER	REV
M	15-4141 / 7514	61-09	3

FILE V11:ZJ1:[246.113]EAST.ACT;1
DATE 21-OCT-94 TIME 14:15:57
ISSUE BY CLAYDEN BOX J13D

D
22X34

NOTES

FOR GENERAL NOTES SEE DRAWING [illegible] 51-10



SCALE

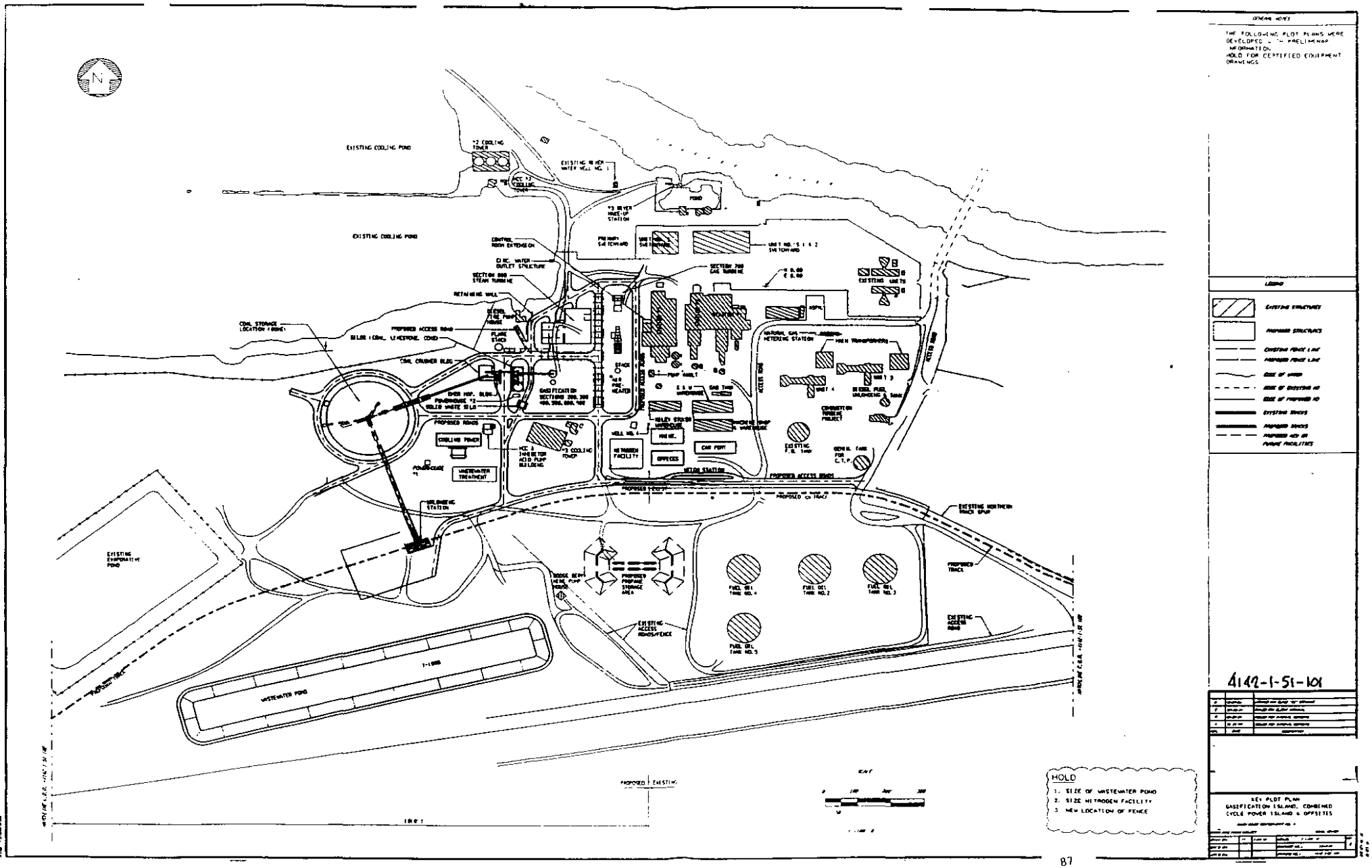
0 200 400 800 1200

100

1"=400'-0

4142-1-51-100

SITE KEY PLOT PLAN



GENERAL NOTES

THE FOLLOWING PLOT PLANS WERE DEVELOPED FOR PRELIMINARY INFORMATION. HOLD FOR CERTIFIED EQUIPMENT DRAWINGS

LEGEND

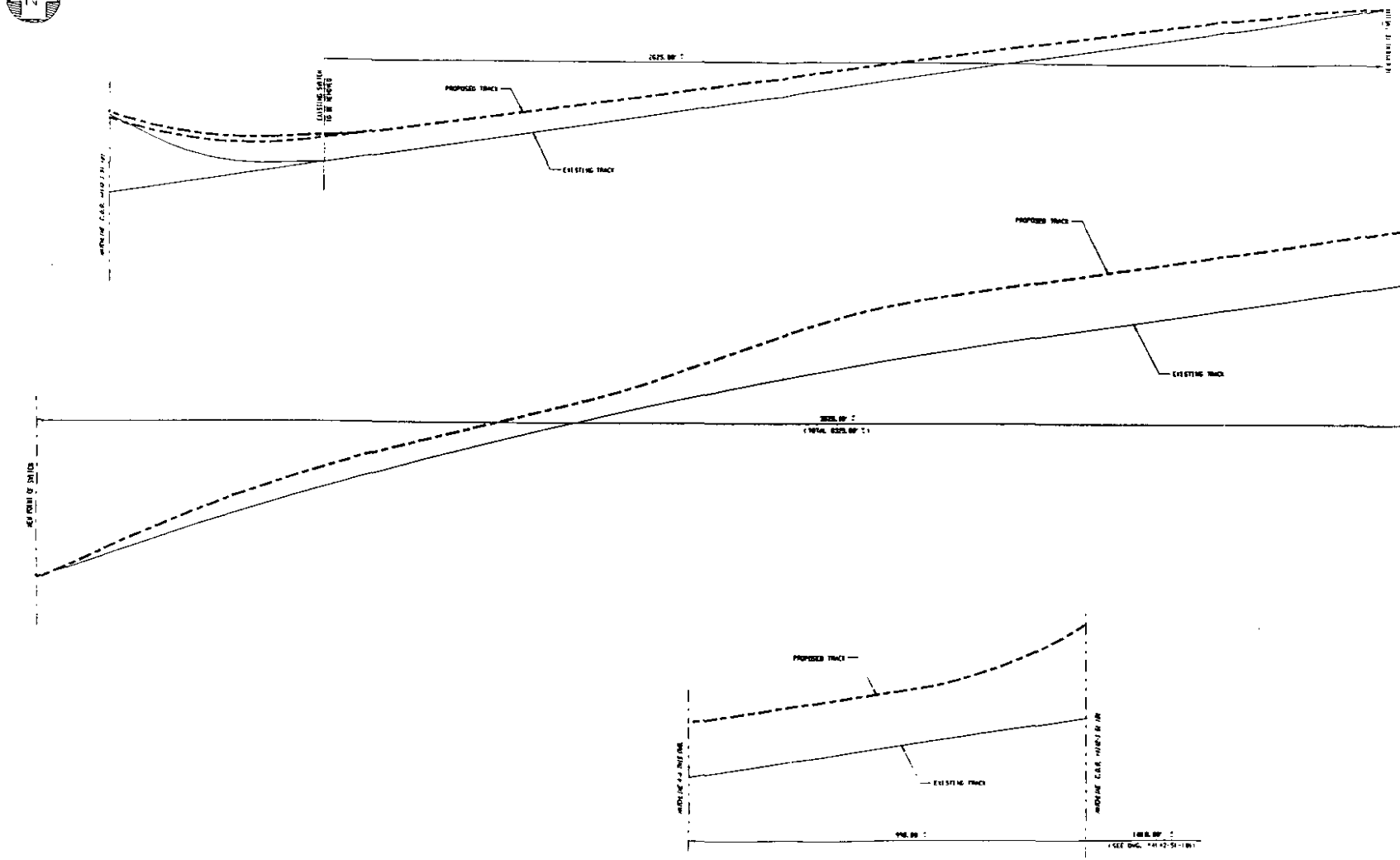
EXISTING STRUCTURES
PROPOSED STRUCTURES
EXISTING FENCE LINE
PROPOSED FENCE LINE
EDGE OF WATER
EDGE OF EXISTING RD
EDGE OF PROPOSED RD
EXISTING TRACKS
PROPOSED TRACKS
PROPOSED RDS OR FUTURE FACILITIES

4142-1-51-101

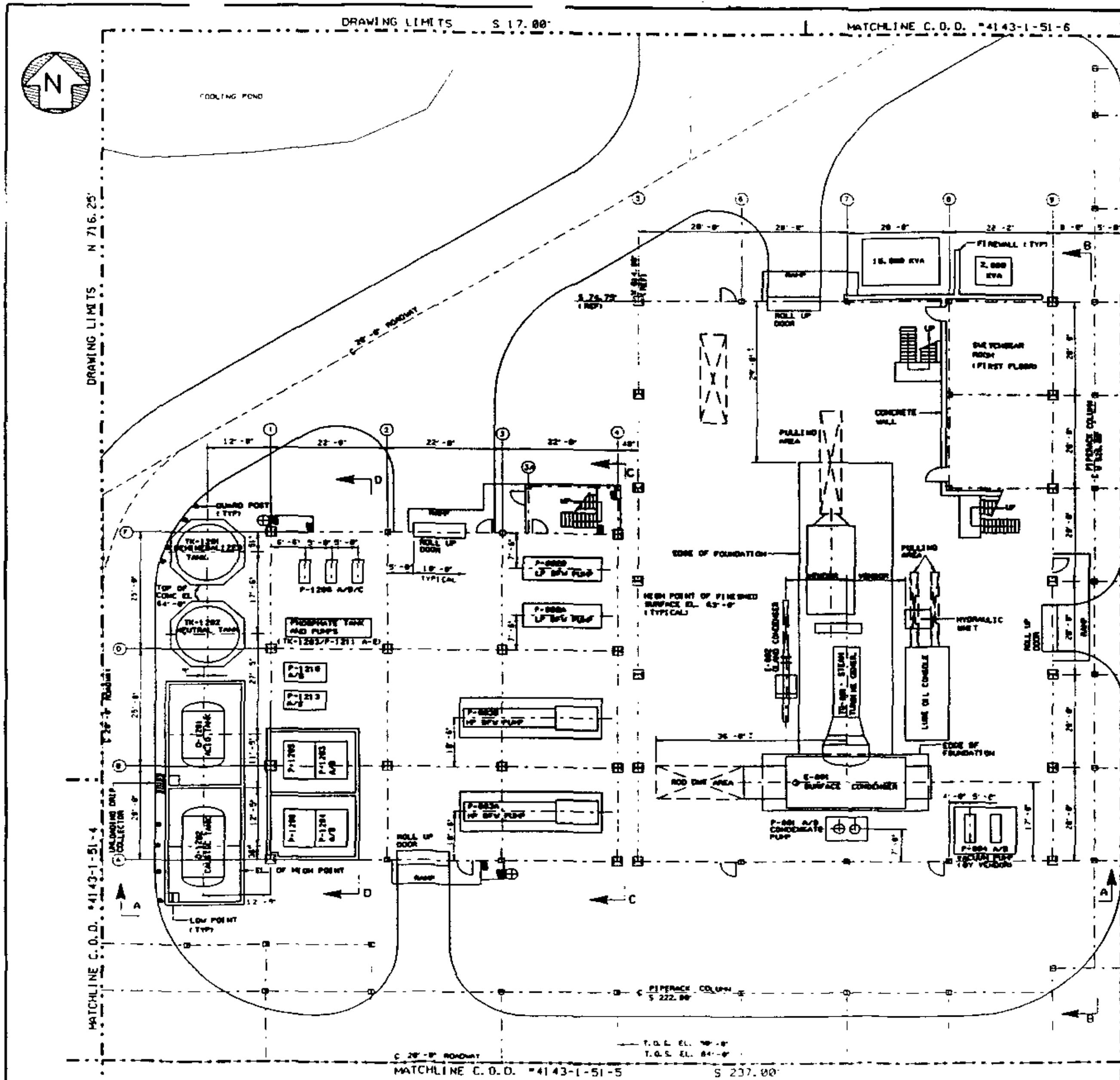
HOLD

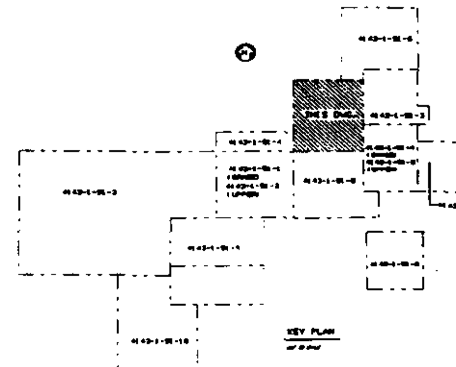
1. SIZE OF WASTEWATER POND
2. SIZE NITROGEN FACILITY
3. NEW LOCATION OF FENCE

KEY PLOT PLAN
GASIFICATION ISLAND, COMBINED CYCLE POWER ISLAND & OFFSITES


PROPOSED TRACK
EXISTING TRACK
PROPOSED TRACK
EXISTING TRACK
PROPOSED TRACK
EXISTING TRACK

4142-1-51-102





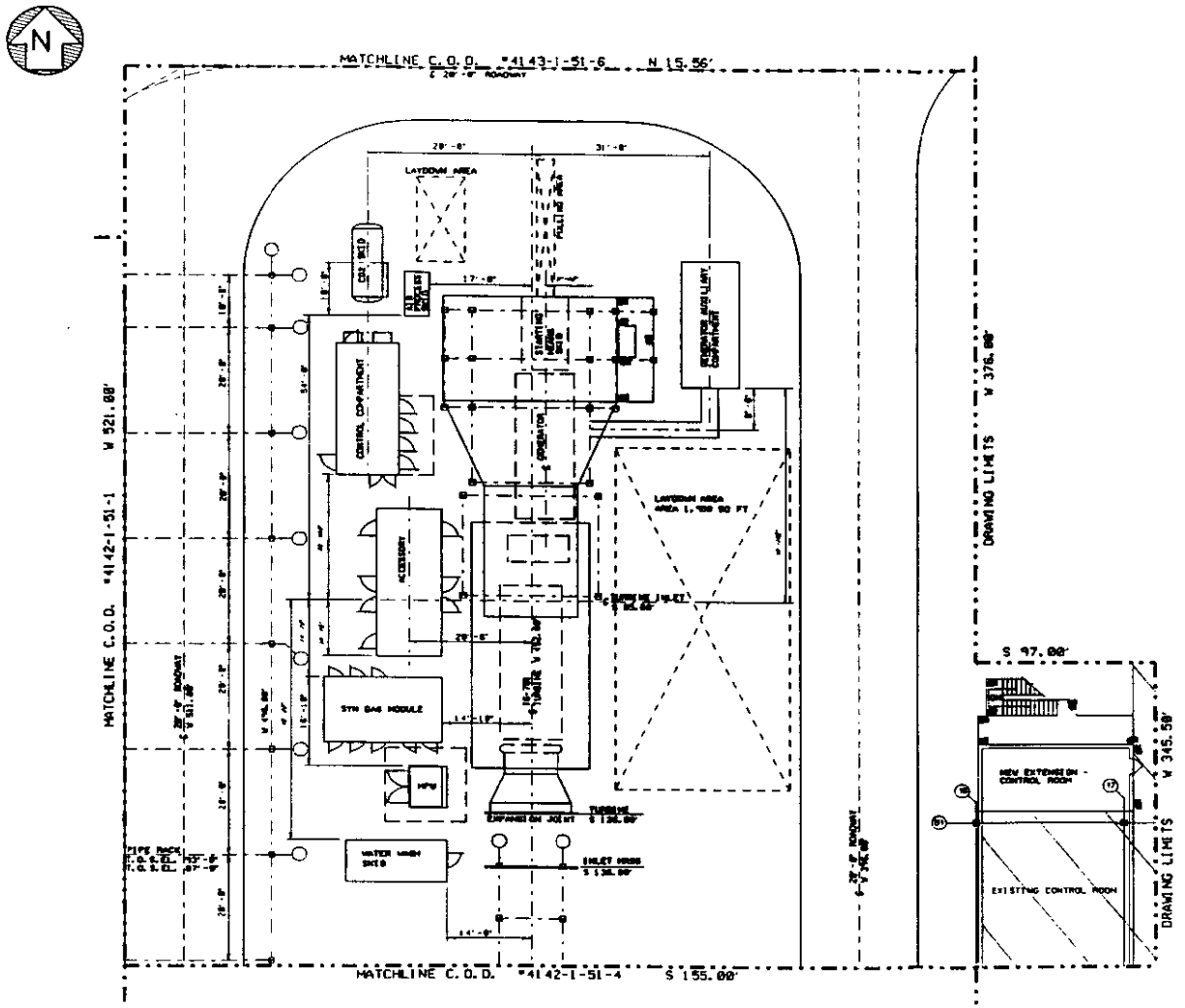
1. FOR GENERAL NOTES SEE DRAWING #4142-1-51-101
2. PLANT REFERENCE ELEVATION WILL BE N.G.V.D. 4263'-0" (FOR THE PURPOSE OF SIMPLIFICATION THE N.G.V.D. 4200'-0" = 0'-0" PLANT ELEVATION HENCE PLANT REFERENCE WILL BE 63'-0")

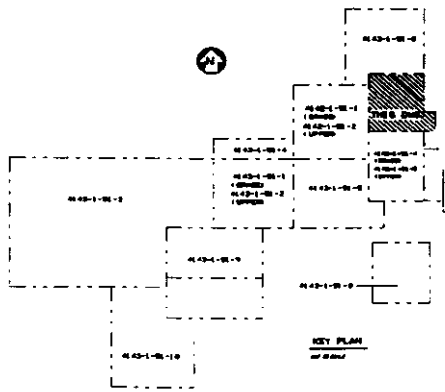
HOLD
1. SIZE BLDG., FDN. & PIPE RACK
2. EQUIPMENT NUMBERS
3. LOCATION OF CLEAN, DIRTY AND OVERFLOW SUMPS
4. VENDOR'S DRAWINGS (ALL)

4142-1-51-1

PLOT PLAN
STEAM TURBINE AT GRADE

4142-1-51-2
HOLD
KEY PLAN
PLOT PLAN
STEAM TURBINE AT UPPER LEVEL
DRAWING LIMITS
MATCHLINE C.O.O.C. 4142-1-51-5
DRAWING LIMITS
DRAWING LIMITS
CRANE RAIL
RAIL STOP (TYPICAL)
CONTROL PANEL
CONTROL PANEL
CONCRETE FLOOR
ROOF
N



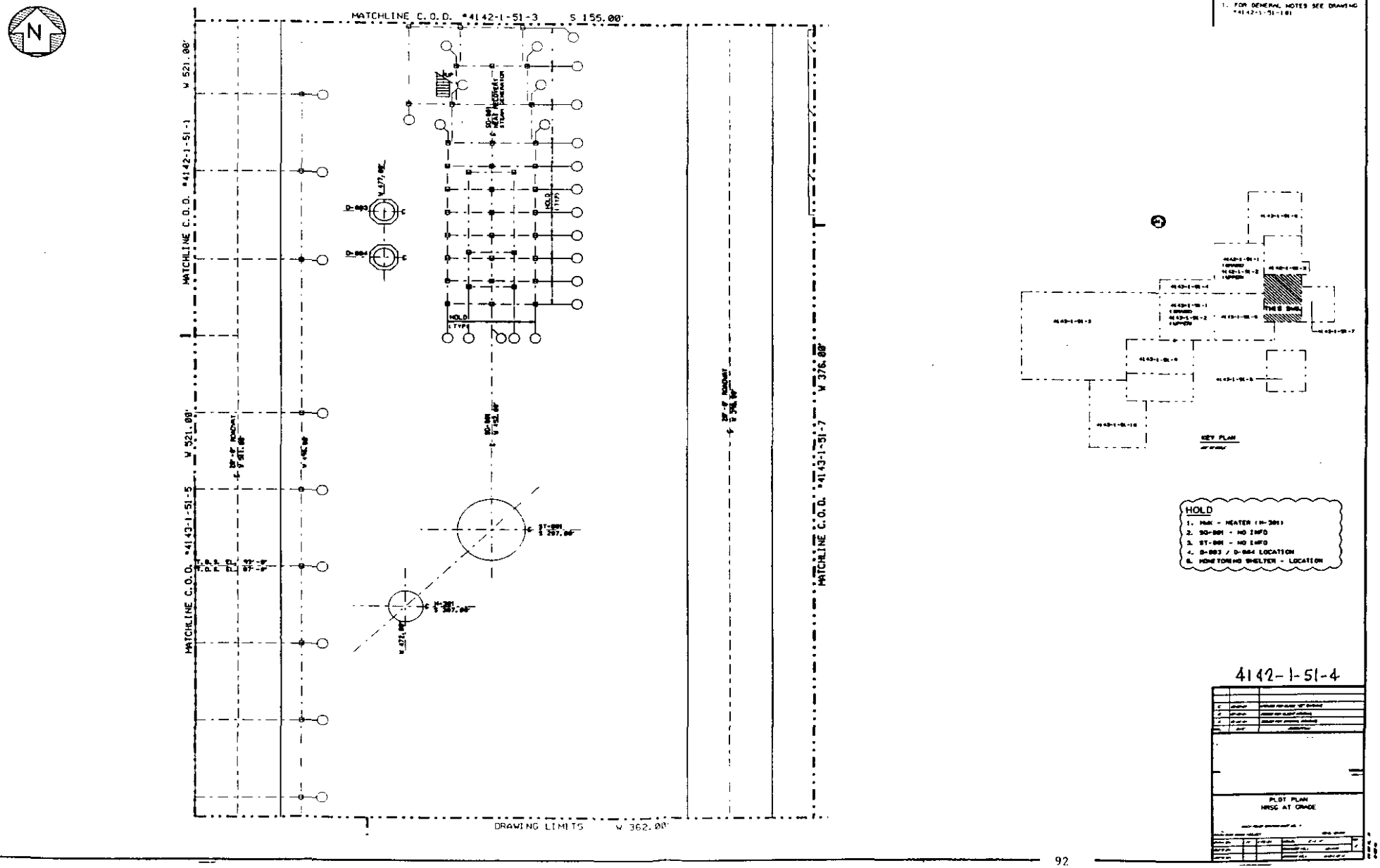


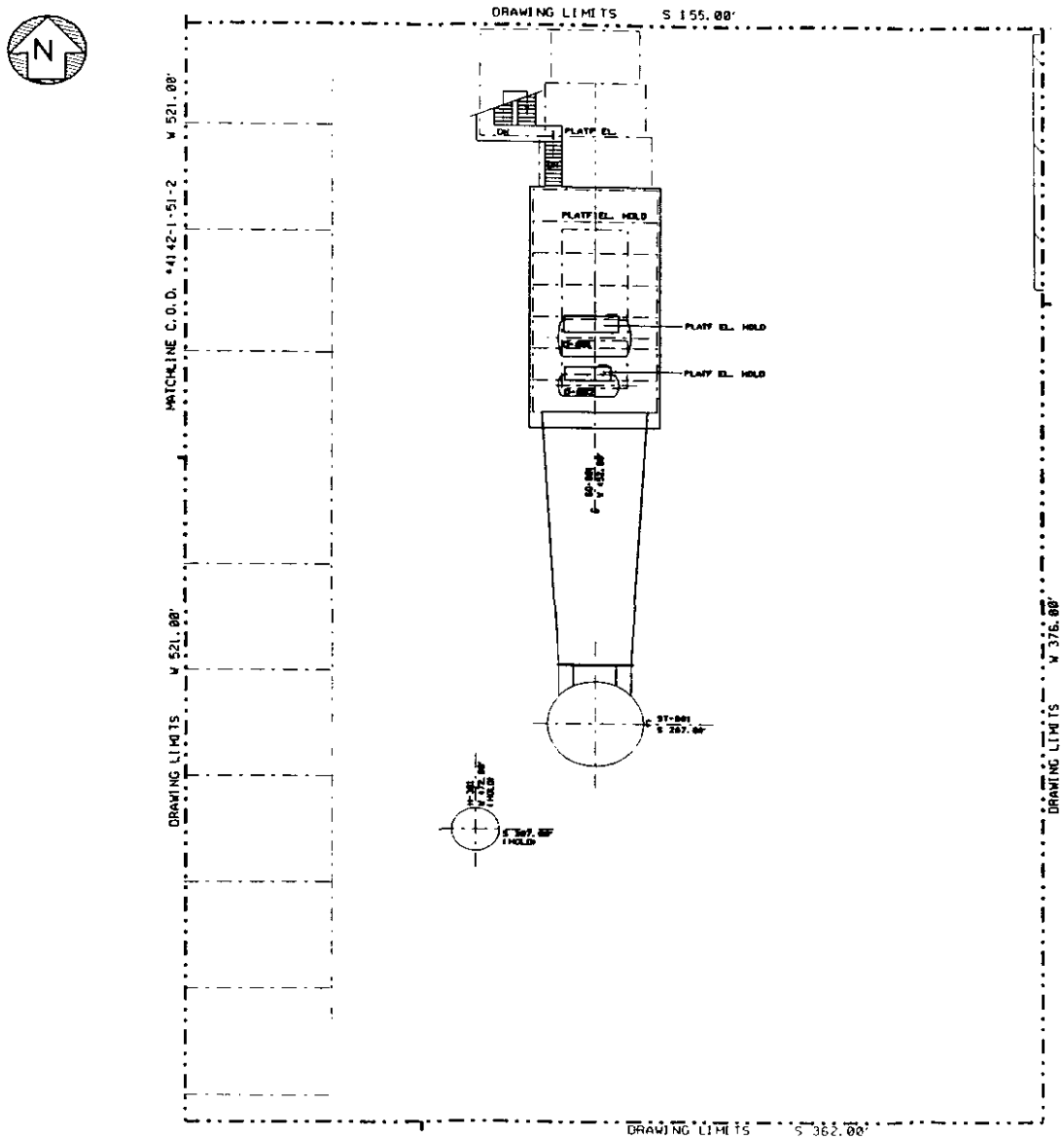
HOLD

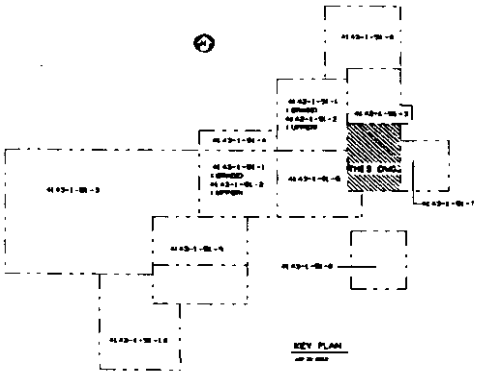
1. STEEL LOCATION OF AIR INLET DUCT
2. SHIPPING SPLITS (BY VENDOR)
3. ELEV OF ALL EQUIPMENT

4142-1-51-3

PLOT PLAN
GAS TURBINE


MATCHLINE C.O.D. *4142-1-51-3 S 155.00'
MATCHLINE C.O.D. *4142-1-51-1 W 521.00'
MATCHLINE C.O.D. *4143-1-51-5 W 521.00'
MATCHLINE C.O.D. *4143-1-51-7 W 376.00'
DRAWING LIMITS W 362.00'
HOLD
1. MAK - HEATER (H-301)
2. SG-001 - NO INFO
3. ST-001 - NO INFO
4. D-003 / D-004 LOCATION
5. MONITORING SHELTER - LOCATION
KEY PLAN
4142-1-51-4
PLOT PLAN
HRSG AT GRADE



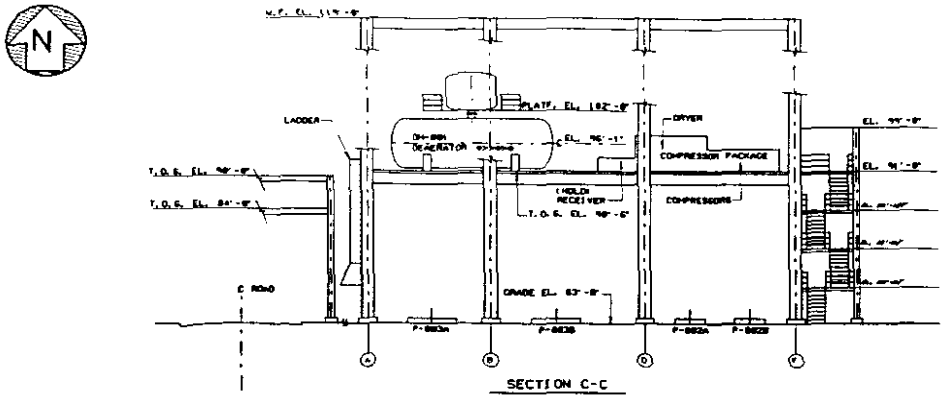


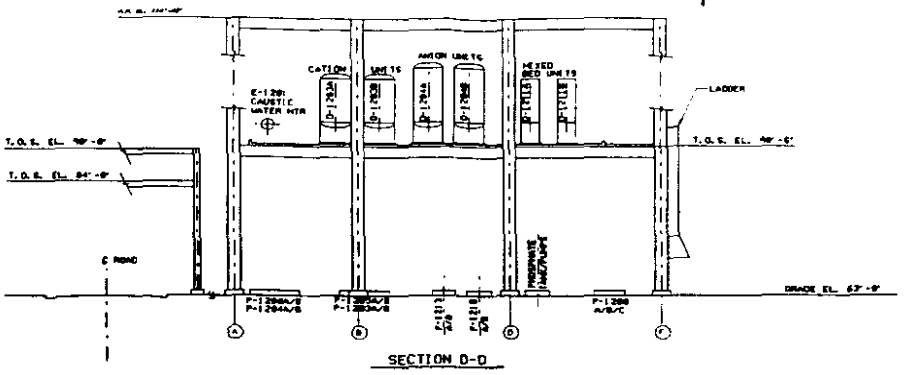
HOLD

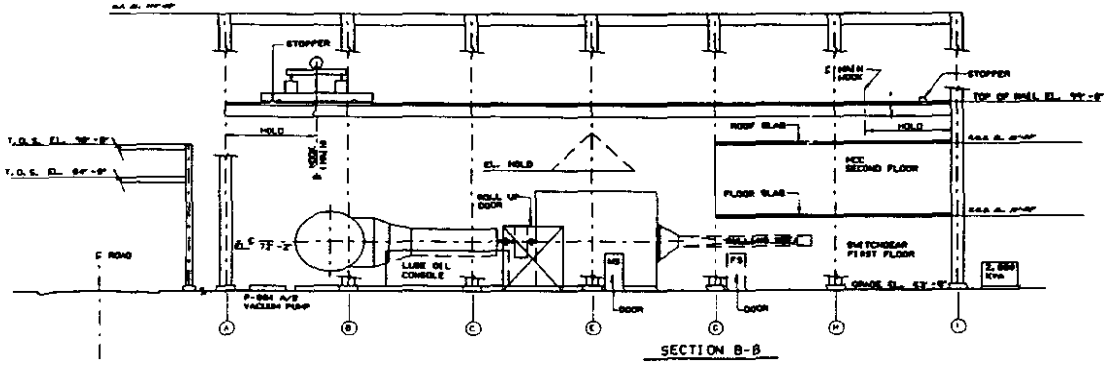
1. LOCATION OF 96-36K - NO INFO
2. 90-86K (BY VENDOR) - NO INFO

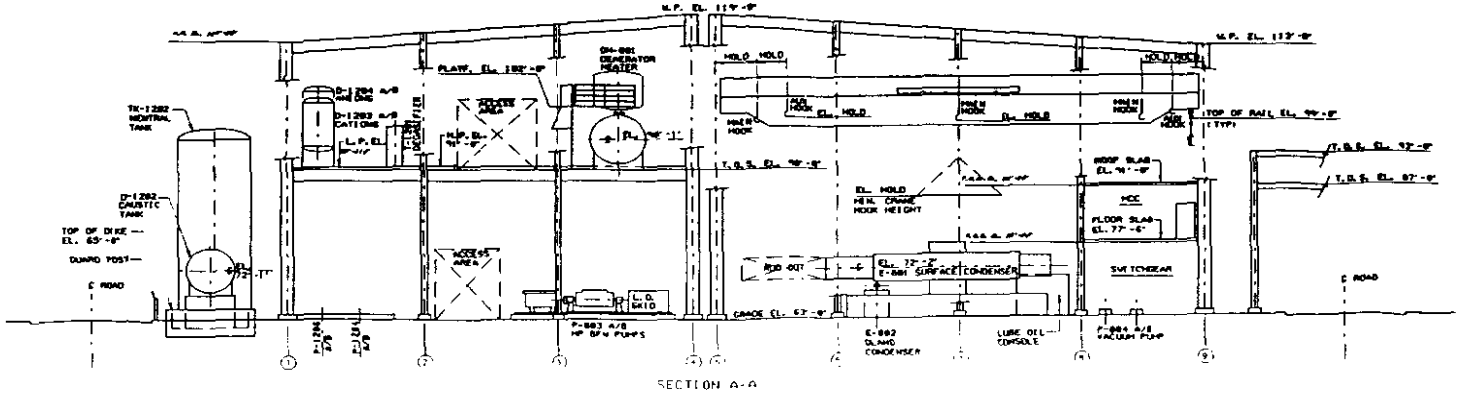
4142-1-51-5

PLOT PLAN
HRSG AT UPPER LEVEL







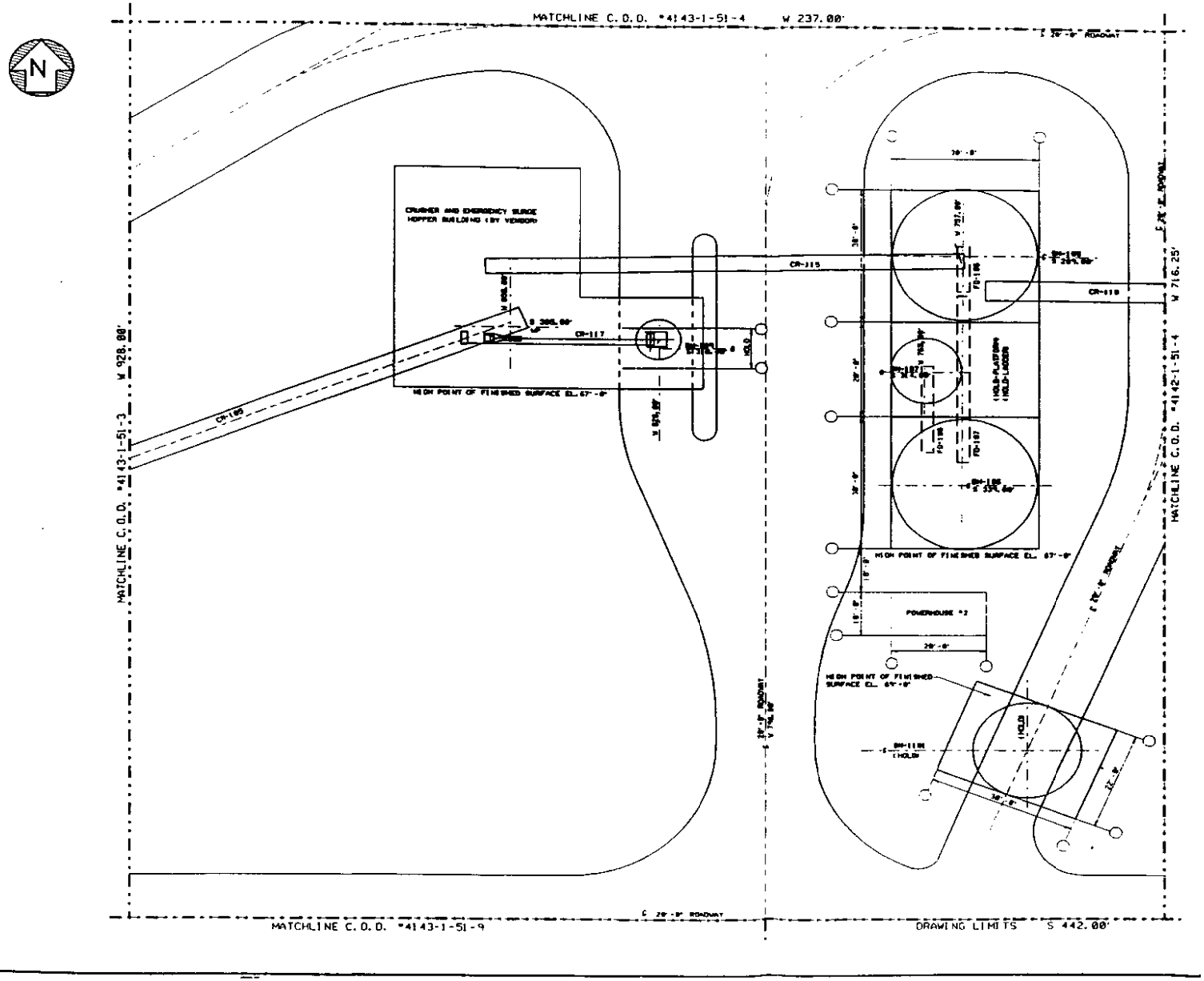


HOLD

1. CRANE BRAN - LOCATION OF RAIL/ ELECTRICAL LINES
2. EQUIPMENT VENDOR DWGS (ALL)
3. BUILDING DIMENSIONS
4. CRANE ELECTRICAL SUPPLY
5. LIFTING PLAY
6. RAIL ELEVATION
7. DIKE CAPACITY

4142-1-51-6

EQUIPMENT ARRANGEMENT SECTION 000 / 1200 (PER 01-51-1)

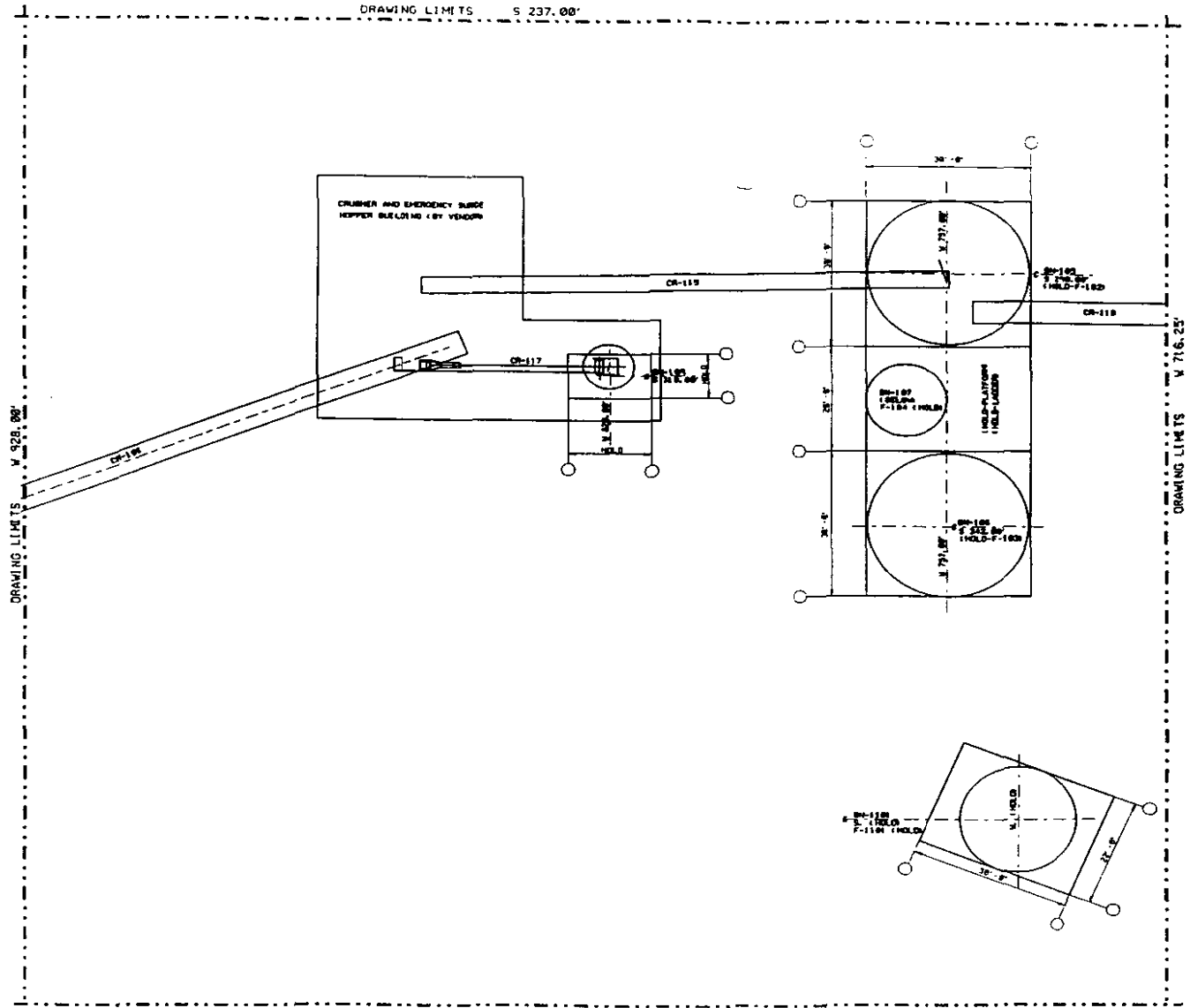


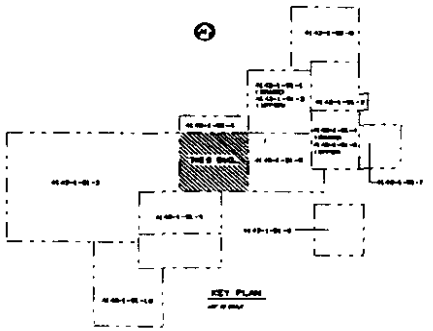
1. FOR GENERAL NOTES SEE DRAWING "4142-1-51-101

HOLD
1. LOCATION OF STAIRS
2. PLATFORM ELEVATION
3. VENDOR'S DRAWINGS
4. POWERHOUSE #2 INFORMATION

4143-1-51-1

PLOT PLAN
SECTION 100 AND 1100 AT BRADE





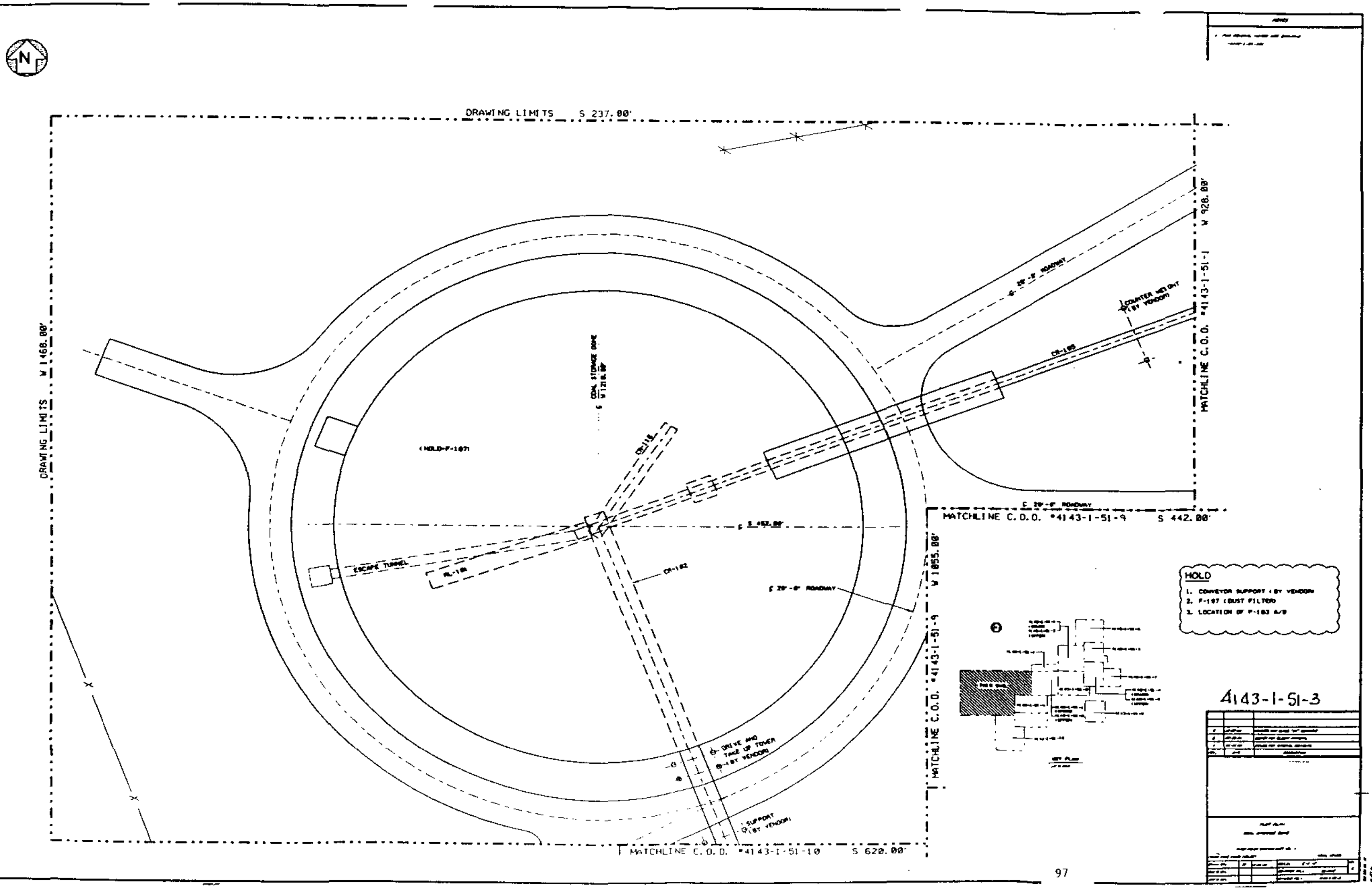
1. FOR GENERAL NOTES SEE DRAWING 4143-1-51-101

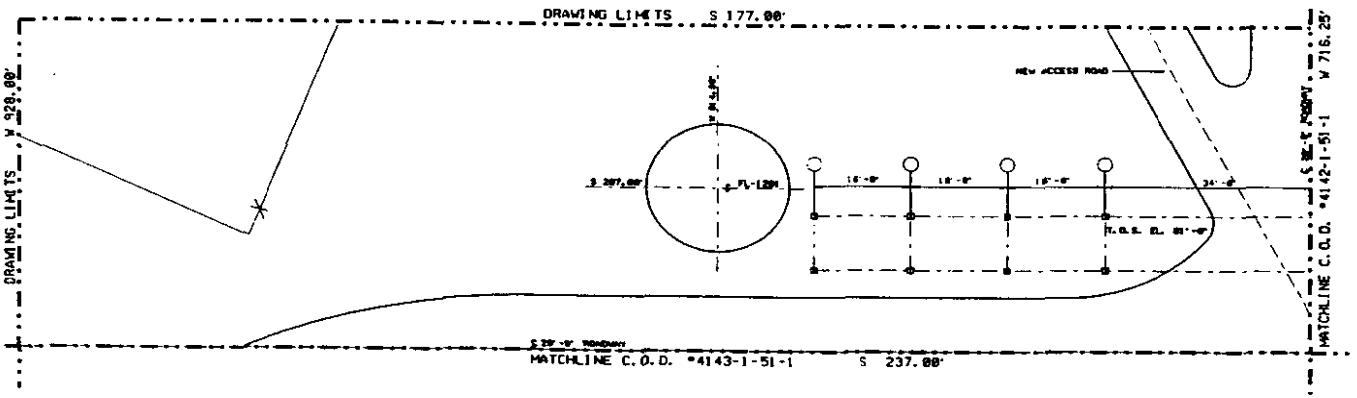
HOLD

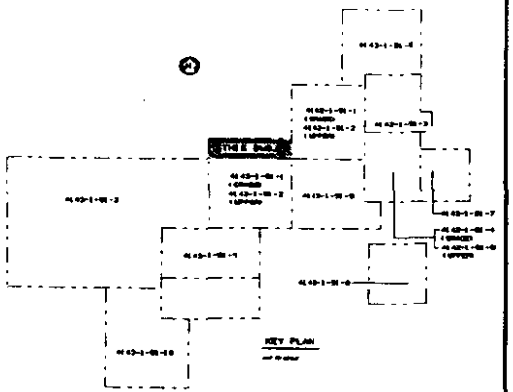
1. LADDER & PLATFORM (ELEV/LOCATION)
2. EQUIPMENT NUMBERS
3. BUILDING SIZE (CRUSHER BLDG)
4. EQUIPMENT LOCATION : P-102
   : P-103
   : P-110

4143-1-51-2

PLOT PLAN
SECTION 100 AND 1100 AT UPPER LEVEL


DRAWING LIMITS S 237.00'
DRAWING LIMITS W 1468.00'
MATCHLINE C.O.D. #4143-1-51-1 W 928.00'
MATCHLINE C.O.D. #4143-1-51-9 S 442.00'
MATCHLINE C.O.D. #4143-1-51-9 W 1055.00'
MATCHLINE C.O.D. #4143-1-51-10 S 620.00'
COUNTER WEIGHT (BY VENDOR)
CR-185
CR-110
CR-182
RL-186
ESCAPE TUNNEL
(HOLD-F-187)
COAL STORAGE DOME
DRIVE AND TAKE UP TOWER (BY VENDOR)
SUPPORT (BY VENDOR)
HOLD
1. CONVEYOR SUPPORT (BY VENDOR)
2. F-187 (DUST FILTER)
3. LOCATION OF F-183 A/B
4143-1-51-3



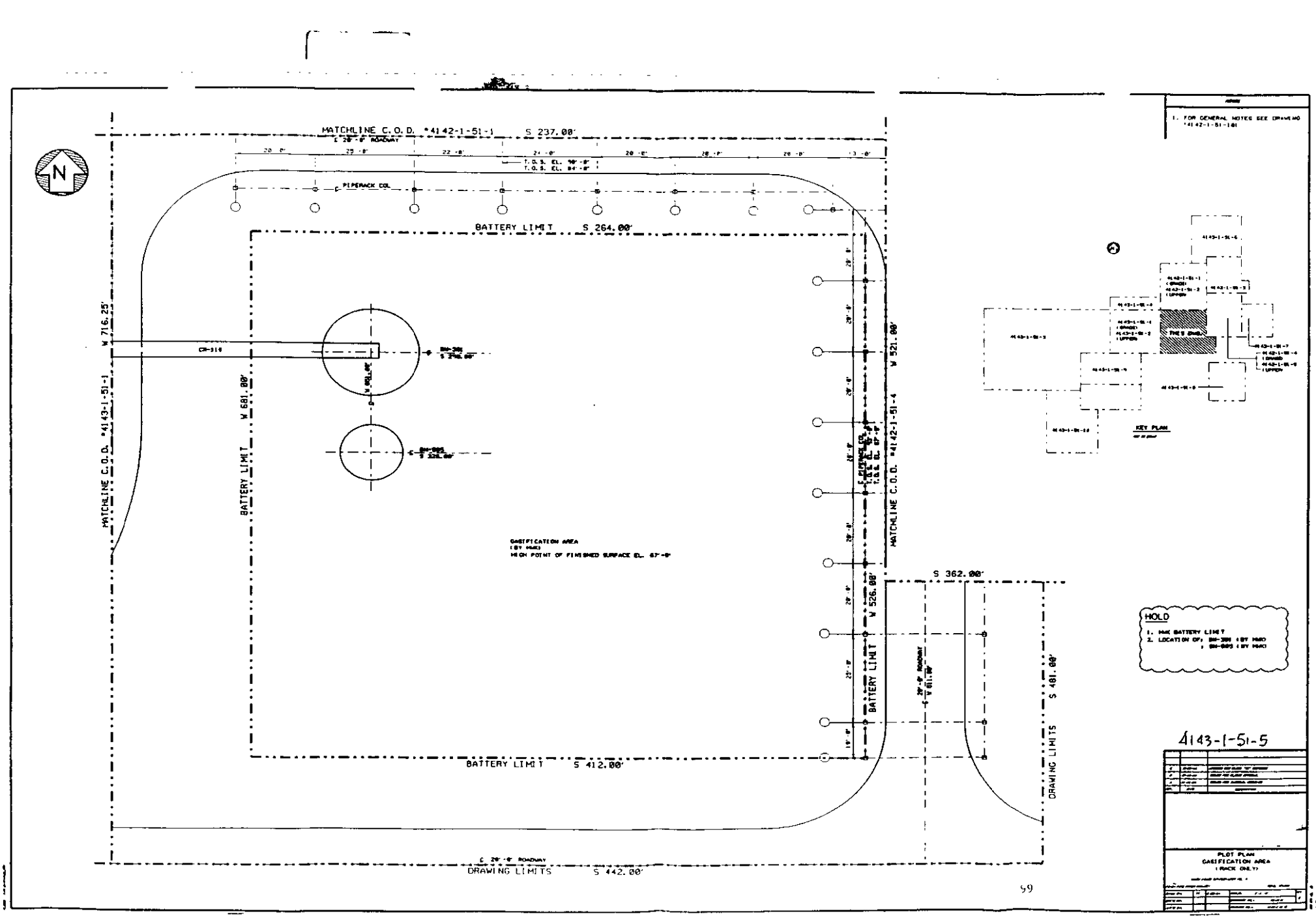


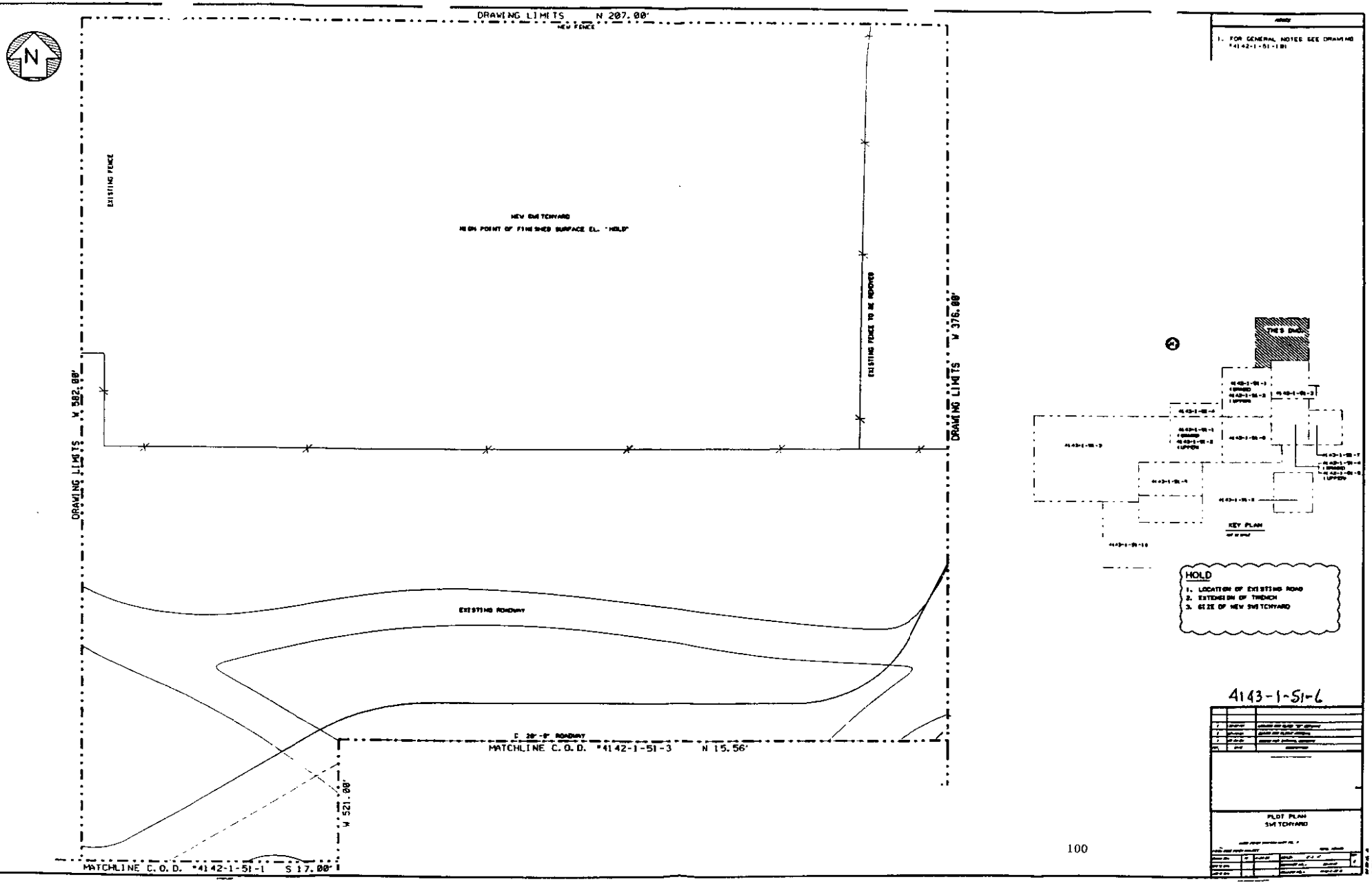
1. FOR GENERAL NOTES SEE DRAWING *4142-1-51-100

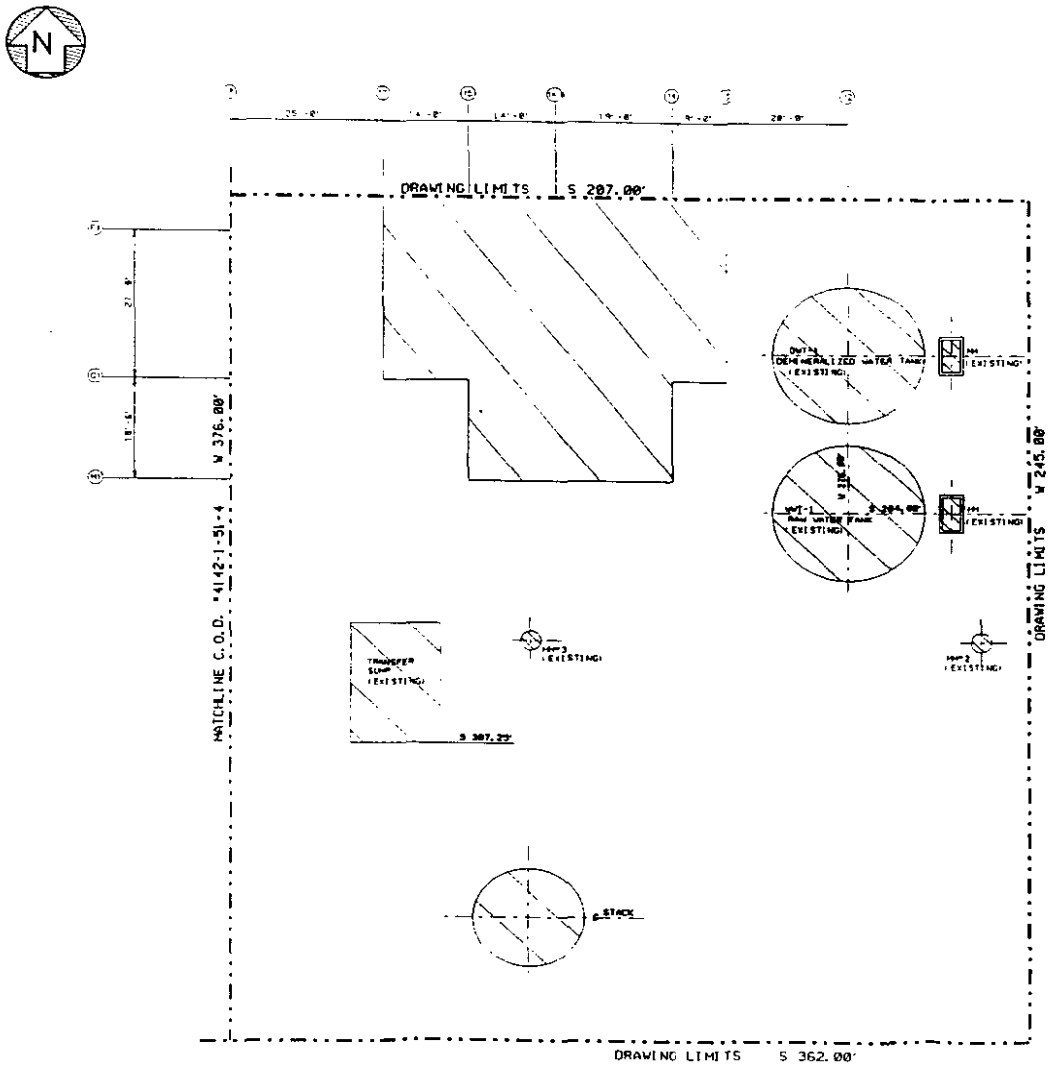
HOLD
1. FLARE SIZE

4143-1-51-4

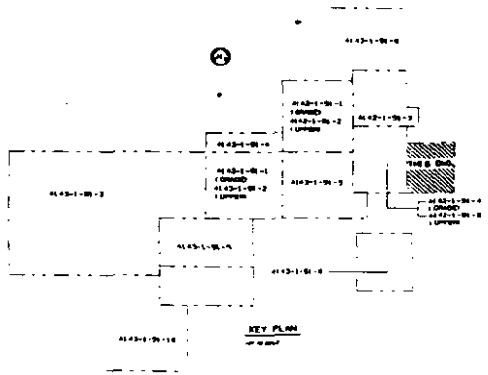
PLOT PLAN
FLARE STACK


MATCHLINE C.O.D. "4142-1-51-1 S 237.00'
PIPERACK COL
BATTERY LIMIT S 264.00'
MATCHLINE C.O.D. "4143-1-51-1
W 716.25'
BATTERY LIMIT W 681.00'
W 521.00'
MATCHLINE C.O.D. "4142-1-51-4
GASIFICATION AREA
S 362.00'
W 526.00'
BATTERY LIMIT
S 481.00'
DRAWING LIMITS
BATTERY LIMIT S 412.00'
DRAWING LIMITS S 442.00'
KEY PLAN
HOLD
4143-1-51-5
PLOT PLAN
GASIFICATION AREA


DRAWING LIMITS N 207.00'
NEW FENCE
EXISTING FENCE
NEW SWITCHYARD
HIGH POINT OF FINISHED SURFACE EL. "HOLD"
EXISTING FENCE TO BE REMOVED
DRAWING LIMITS W 582.00'
DRAWING LIMITS W 376.00'
EXISTING ROADWAY
E 20'-0" ROADWAY
MATCHLINE C.O.D. "4142-1-51-3 N 15.56'
W 521.00'
MATCHLINE C.O.D. "4142-1-51-1 S 17.00'
1. FOR GENERAL NOTES SEE DRAWING "4142-1-51-101
KEY PLAN
HOLD
1. LOCATION OF EXISTING ROAD
2. EXTENSION OF TRENCH
3. SIZE OF NEW SWITCHYARD
4143-1-51-6
PLOT PLAN
SWITCHYARD



1. FOR GENERAL NOTES SEE DRAWING "4142-1-51-101"

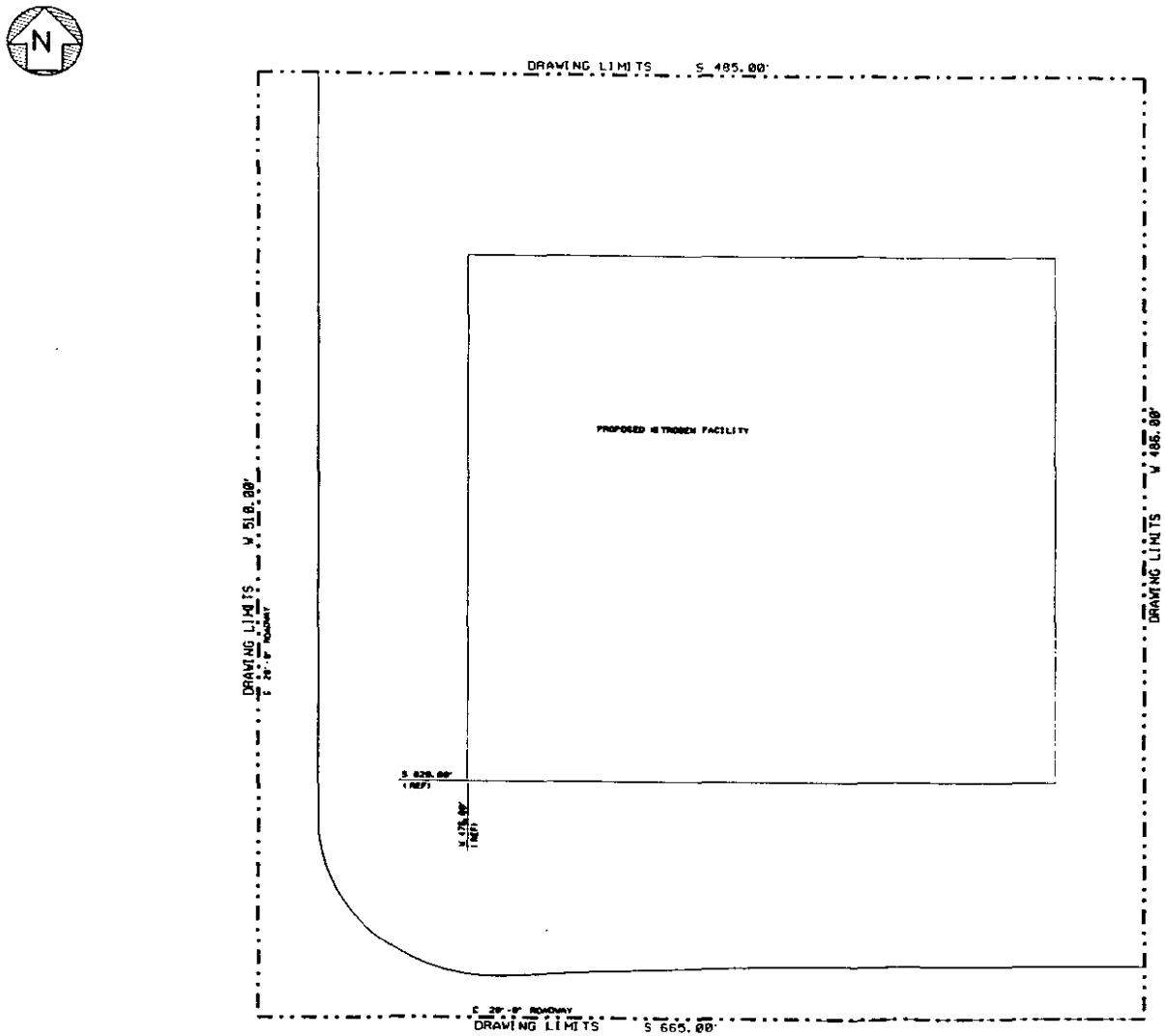


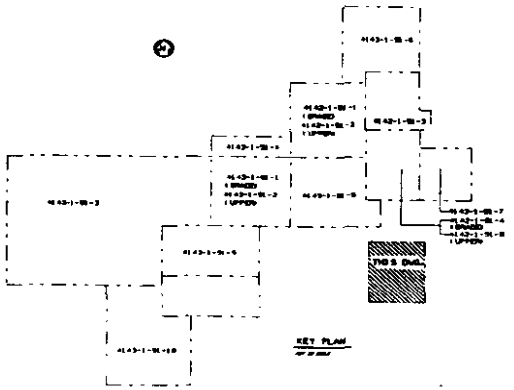
HOLD

1. LOCATION OF P-1202 A/B

4143-1-51-7

PLOT PLAN
TRANSFER SUMP



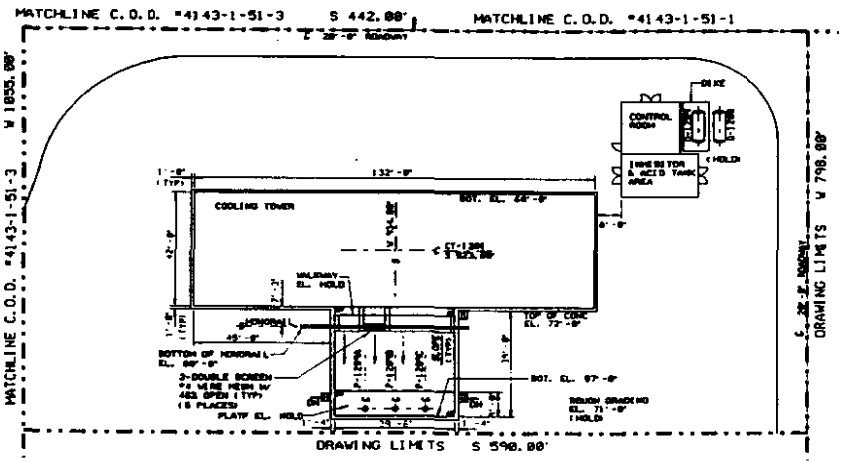


HOLD

1. EQUIPMENT NUMBER/INFORMATION

4143-1-51-8

PLOT PLAN
NITROGEN FACILITY

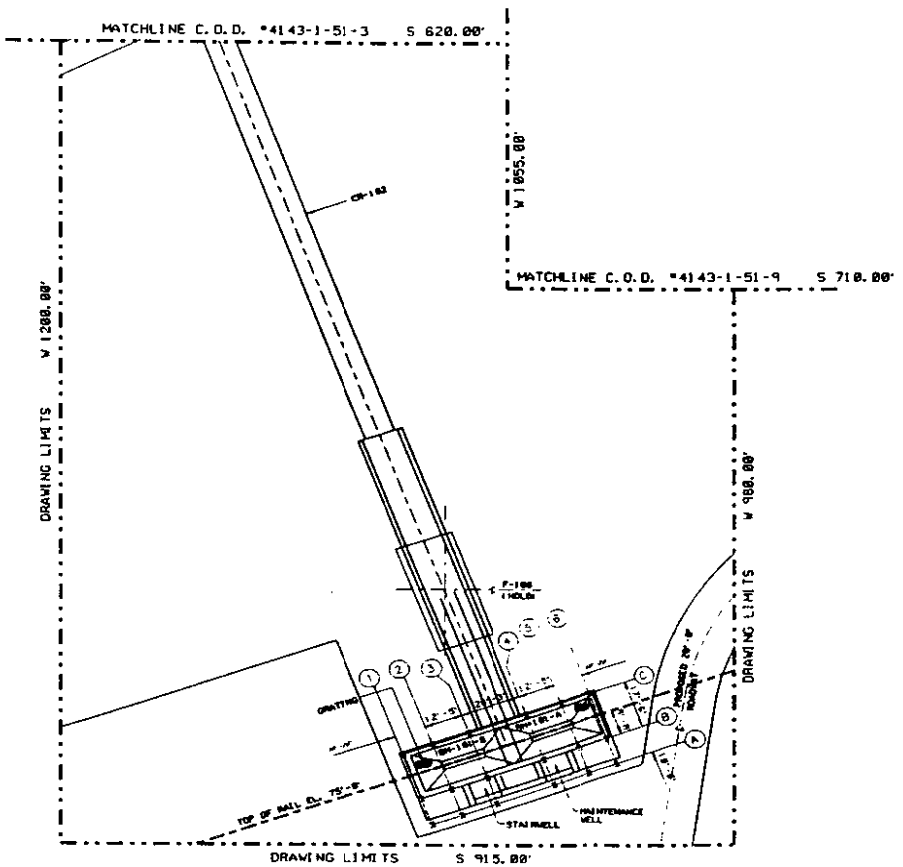


HOLD

1. COOLING TOWER-DETAIL
2. BLDG SIZE - NO INFO
   a. HCC COOLING TOWER
   b. ACID/INVERTOR AREA
3. ELEV OF COOLING TOWER AND ROUGH GRADING
4. DIKE SIZE FOR D-1304
5. PLATFORM ELEVATION
6. D-1294 AND D-1298 SIZES

4143-1-51-9

PLOT PLAN
COOLING TOWER



HOLD

1. LOCATION OF CONVEYOR SUPPORT (BY VENDOR)
2. DETAIL OF UNLOADING (BY CIVIL)
3. LOCATION OF P-104 A/B SUMP PUMP
4. P-108 INFO (DUST COLLECTOR)

4143-1-51-10

SIERRA PACIFIC POWER COMPANY

TRACY 4 - PIÑON PROJECT

RENO, NEVADA

HEAT AND MATERIAL BALANCE - BASE CASE

THE M. W. KELLOGG COMPANY

JOB 7514

DATE	REV #	PREP'D	CHECKED	CTE APPR
27 JUL 93	0	FC	GKM	GBH
11 APR 94	1	SN	GKM	GBH
08 JUN 94	2	SN	GKM	GBH
09 DEC 94	3	SN	JOD	RH

HEAT AND MATERIAL BALANCE - BASE CASE
UNDRIED SUFCO COAL WITH TRANSPORT DESULFURIZER

IDENTIFICATION	Molecular Weight	1 Prepared Coal Feedstock		2 Limestone Feedstock		3 Ash Withdrawal From Gasifier		4 Coal Transport Air	
		Wt%	Lb/Hr	Wt%	Lb/Hr	Wt%	Lb/Hr	Vol%	Lb/Hr
GASES:									
Carbon Monoxide	28.01							0.00	0
Hydrogen	2.02							0.00	0
Carbon Dioxide	44.01							0.00	0
Methane	16.04							0.00	0
Nitrogen	28.01							78.00	14,645
Argon	39.95							0.90	240
Oxygen	32.00							20.82	4,466
Ammonia	17.03							0.00	0
Hydrogen Sulfide	34.08							0.00	0
Carbonyl Sulfide	60.08							0.00	0
Sulfur Dioxide	64.06							0.00	0
Water Vapor	18.02							0.29	35
Hydrogen Chloride	36.46							0.00	0
TOTAL GASES								100.00	19,385
Gas Flow, Lb Moles/Hr									670.3
Molecular Weight, Gases									28.92
Gas Volume, ACFM									193.0
Gas Volume, SCFM									4,238
LIQUIDS:									
Water	18.02								
SOLIDS:									
Carbon	12.01	64.24	47,249			27.19	1,685		
Hydrogen	1.01	4.33	3,187			0.07	5		
Oxygen	16.00	10.94	8,043			0.35	22		
Nitrogen	14.01	1.08	798			0.22	14		
Sulfur	32.06	0.41	298			0.17	10		
Chlorides	35.45	0.00	0			0.00	0		
Ash		9.00	6,620			72.00	4,463		
Moisture	18.02	10.00	7,355			0.00	0		
TOTAL SOLIDS		100.00	73,550			100.00	6,199		
SORBENT:									
CaO	56.08			0.00	0	74.50	1,305		
CaCO3	100.09			90.04	3,720	0.00	0		
CaS	72.14			0.00	0	12.44	218		
CaSO4	136.14			0.00	0	0.00	0		
MgO	40.31			0.00	0	3.26	57		
MgCO3	84.32			4.09	169	0.00	0		
Inerts				5.87	242	9.79	172		
TOTAL SORBENT				100.00	4,131	100.00	1,752		
TOTAL FLOW, Lb/Hr			73,550		4,131		7,951		19,385
HEATING VALUE:									
Gas LHV, Btu/SCF									
Gaseous Fuel LHV, MMBtu/hr									
TEMPERATURE, F			50		50		500		120
PRESSURE, PSIA			13		13		310 (3)		360

HEAT AND MATERIAL BALANCE - BASE CASE
UNDRIED SUFCO COAL WITH TRANSPORT DESULFURIZER

IDENTIFICATION	Molecular Weight	5 Process Air To Gasifier		6 Product Gas From Gasifier		7 Product Gas From Cyclone		8 Total Air From Gas Turbine (3)	
		Vol%	Lb/Hr	Vol%	Lb/Hr	Vol%	Lb/Hr	Vol%	Lb/Hr
GASES:									
Carbon Monoxide	28.01	0.00	0	23.89	82,996	23.89	82,996	0.00	0
Hydrogen	2.02	0.00	0	14.57	3,643	14.57	3,643	0.00	0
Carbon Dioxide	44.01	0.00	0	5.44	29,708	5.44	29,708	0.00	0
Methane	16.04	0.00	0	1.35	2,679	1.35	2,679	0.00	0
Nitrogen	28.01	78.00	145,063	48.65	169,052	48.65	169,052	78.00	164,042
Argon	39.95	0.90	2,379	0.56	2,760	0.56	2,760	0.90	2,690
Oxygen	32.00	20.82	44,235	0.00	0	0.00	0	20.82	50,022
Ammonia	17.03	0.00	0	0.02	40	0.02	40	0.00	0
Hydrogen Sulfide	34.08	0.00	0	0.03	127	0.03	127	0.00	0
Carbonyl Sulfide	60.08	0.00	0	0.00	30	0.00	30	0.00	0
Sulfur Dioxide	64.06	0.00	0	0.00	0	0.00	0	0.00	0
Water Vapor	18.02	0.29	342	5.50	12,284	5.50	12,284	0.29	387
Hydrogen Chloride	36.46	0.00	0	0.00	0	0.00	0	0.00	0
TOTAL GASES		100.00	192,019	100.00	303,319	100.00	303,319	100.00	217,141
Gas Flow, Lb Moles/Hr			6639.3		12404.2		12404.2		7,508.0
Molecular Weight, Gases			28.92		24.45		24.45		28.92
Gas Volume, ACFM			3660.0		16992.1		17166.6		10067.6
Gas Volume, SCFM			41,977		78,425		78,425		47,469
LIQUIDS:									
Water	18.02								
				Wt%		Wt%			
SOLIDS:									
Carbon	12.01			54.20	45,794	54.20	2,656		
Hydrogen	1.01			0.33	275	0.33	16		
Oxygen	16.00			0.70	591	0.70	34		
Nitrogen	14.01			0.41	345	0.41	20		
Sulfur	32.06			0.36	308	0.36	18		
Chlorides	35.45			0.00	0	0.00	0		
Ash				44.00	37,174	44.00	2,156		
Moisture	18.02			0.00	0	0.00	0		
TOTAL SOLIDS				100.00	84,487	100.00	4,900		
SORBENT:									
CaO	56.08			74.50	26,976	74.50	539		
CaCO3	100.09			0.00	0	0.00	0		
CaS	72.14			12.44	4,505	12.44	90		
CaSO4	136.14			0.00	0	0.00	0		
MgO	40.31			3.26	1,181	3.26	24		
MgCO3	84.32			0.00	0	0.00	0		
Inerts				9.79	3,546	9.79	71		
TOTAL SORBENT				100.00	36,209	100.00	724		
TOTAL FLOW, Lb/Hr			192,019		424,015		308,943		217,141
HEATING VALUE:									
Gas LHV, Btu/SCF					129		129		-
Gaseous Fuel LHV, MMBtu/hr					607.4		607.4		
TEMPERATURE, F			650		1,800		1,800 (3)		752
PRESSURE, PSIA			360		295		292 (3)		162

HEAT AND MATERIAL BALANCE - BASE CASE
UNDRIED SUFCO COAL WITH TRANSPORT DESULFURIZER

IDENTIFICATION	Molecular Weight	9 Recycle Gas To Grid		10 Steam to Gasifier		11 Recycle Gas to Annulus		12 Product Gas From Desulfurizer (3)	
		Vol%	Lb/Hr	Vol%	Lb/Hr	Vol%	Lb/Hr	Vol%	Lb/Hr
GASES:									
Carbon Monoxide	28.01	23.91	736			23.91	2,864	23.89	86,604
Hydrogen	2.02	14.58	32			14.58	126	14.57	3,802
Carbon Dioxide	44.01	5.45	264			5.45	1,026	5.45	31,022
Methane	16.04	1.35	24			1.35	92	1.35	2,795
Nitrogen	28.01	48.70	1,500			48.70	5,833	48.66	176,400
Argon	39.95	0.56	24			0.56	95	0.56	2,880
Oxygen	32.00	0.00	0			0.00	0	0.00	0
Ammonia	17.03	0.02	0			0.02	1	0.02	42
Hydrogen Sulfide	34.08	0.00	0			0.00	0	0.00	9
Carbonyl Sulfide	*60.08*	*0.00*	*0*			*0.00*	*0*	*0.00*	*0*
Sulfur Dioxide	64.06	0.00	0			0.00	0	0.00	0
Water Vapor	18.02	5.43	108	100.00	12,356	5.43	419	5.51	12,836
Hydrogen Chloride	36.46	0.00	0			0.00	0	0.00	0
TOTAL GASES		100.00	2,689	100.00	12,356	100.00	10,455	100.00	316,389
Gas Flow, Lb Moles/Hr			109.9		685.9		427.6		12,941
Molecular Weight, Gases			24.45		18.02		24.45		24.45
Gas Volume, ACFM			47.5		312.8		184.8		12,462
Gas Volume, SCFM			695		4,336		2,703		81,819
LIQUIDS:									
Water	18.02								
								Wt%	
SOLIDS:									
Carbon	12.01							54.20	2,531
Hydrogen	1.01							0.33	15
Oxygen	16.00							0.70	33
Nitrogen	14.01							0.41	19
Sulfur	32.06							0.36	17
Chlorides	35.45							0.00	0
Ash								44.00	2,054
Moisture	18.02							*0.00*	*0*
TOTAL SOLIDS								100.00	4,669
SORBENT:									
CaO	56.08							74.50	514
CaCO3	100.09							0.00	0
CaS	72.14							12.44	86
CaSO4	136.14							0.00	0
MgO	40.31							3.26	23
MgCO3	84.32							0.00	0
Inerts								9.79	68
TOTAL SORBENT								100.00	690
TOTAL FLOW, Lb/Hr			2,689		12,356		10,455		321,748
HEATING VALUE:									
Gas LHV, Btu/SCF			129		-		129		129
Gaseous Fuel LHV, MMBtu/hr			5.4				20.9		632.7
TEMPERATURE, F			350 (3)		700		350 (3)		1,013
PRESSURE, PSIA			335		433		335		274

HEAT AND MATERIAL BALANCE - BASE CASE
UNDRIED SUFCO COAL WITH TRANSPORT DESULFURIZER

IDENTIFICATION	Molecular Weight	13 (3) Condensate From Recycle Gas		14 (Note 1) (3) Blowback Gas to Filter		15 (3) Recycle Gas To RG Booster Comp.		16 (Note 1) (3) Pressurization Recycle Gas	
		Wt%	Lb/Hr	Vol%	Lb/Hr	Vol%	Lb/Hr	Vol%	Lb/Hr
GASES:									
Carbon Monoxide	28.01			25.21	1266	25.21	1,444	25.21	177
Hydrogen	2.02			15.37	56	15.37	63	15.37	8
Carbon Dioxide	44.01			5.75	454	5.75	517	5.75	63
Methane	16.04			1.42	41	1.42	47	1.42	6
Nitrogen	28.01			51.34	2579	51.34	2,940	51.34	361
Argon	39.95			0.59	42	0.59	48	0.59	6
Oxygen	32.00			0.00	0	0.00	0	0.00	0
Ammonia	17.03			0.02	1	0.02	1	0.02	0
Hydrogen Sulfide	34.08			0.00	0	0.00	0	0.00	0
Carbonyl Sulfide	60.08			0.00	0	0.00	0	0.00	0
Sulfur Dioxide	64.06			0.00	0	0.00	0	0.00	0
Water Vapor	18.02			0.30	10	0.30	11	0.30	1
Hydrogen Chloride	36.46			0.00	0	0.00	0	0.00	0
TOTAL GASES				100.00	4,448	100.00	5,071	100.00	622
Gas Flow, Lb Moles/Hr					179.3		204.4		25.1
Molecular Weight, Gases					24.80		24.80		24.80
Gas Volume, ACFM					18.4		80.5		5.5
Gas Volume, SCFM					1,134		1,293		159
LIQUIDS:									
Water	18.02	100.00	200						
SOLIDS:									
Carbon	12.01								
Hydrogen	1.01								
Oxygen	16.00								
Nitrogen	14.01								
Sulfur	32.06								
Chlorides	35.45								
Ash									
Moisture	18.02								
TOTAL SOLIDS									
SORBENT:									
CaO	56.08								
CaCO3	100.09								
CaS	72.14								
CaSO4	136.14								
MgO	40.31								
MgCO3	84.32								
Inerts									
TOTAL SORBENT									
TOTAL FLOW, Lb/Hr			200		4,448		5,071		622
HEATING VALUE:									
Gas LHV, Btu/SCF					136		136		136
Gaseous Fuel LHV, MMBtu/hr					9.3		10.5		1.3
TEMPERATURE, F			90		230		90		230
PRESSURE, PSIA			250		1,200		250		565

Note 1: Streams 14 and 16 are time averaged flow rates.
Stream 14 also includes 1200 lb/hr instrument purge flow.

HEAT AND MATERIAL BALANCE - BASE CASE
UNDRIED SUFCO COAL WITH TRANSPORT DESULFURIZER

IDENTIFICATION	Molecular Weight	17 (3) Sorbent Regeneration Gas To Sulfator		18 (3) Cooled Recycle Gas		19 (Note 1) Pressurization Air		20 (3) Hot Recycle Gas	
		Vol%	Lb/Hr	Vol%	Lb/Hr	Vol%	Lb/Hr	Vol%	Lb/Hr
GASES:									
Carbon Monoxide	28.01	0.00	0	23.91	10,566	0.00	0	23.91	10,565
Hydrogen	2.02	0.00	0	14.58	464	0.00	0	14.58	464
Carbon Dioxide	44.01	0.00	0	5.45	3,785	0.00	0	5.45	3,785
Methane	16.04	0.00	0	1.35	341	0.00	0	1.35	341
Nitrogen	28.01	83.81	626	48.70	21,521	78.00	2,970	48.70	21,520
Argon	39.95	0.96	10	0.56	351	0.90	49	0.56	351
Oxygen	32.00	0.00	0	0.00	0	20.82	906	0.00	0
Ammonia	17.03	0.00	0	0.02	5	0.00	0	0.02	5
Hydrogen Sulfide	34.08	0.00	0	0.00	1	0.00	0	0.00	1
Carbonyl Sulfide	60.08	0.00	0	0.00	0	0.00	0	0.00	0
Sulfur Dioxide	64.06	14.91	255	0.00	0	0.00	0	0.00	0
Water Vapor	18.02	0.31	1	5.43	1,545	0.29	7	5.43	1,545
Hydrogen Chloride	36.46	0.00	0	0.00	0	0.00	0	0.00	0
TOTAL GASES		99.99	892	100.00	38,578	100.00	3,932	100.00	38,577
Gas Flow, Lb Moles/Hr			26.6		1,577.6		136.0		1,577.6
Molecular Weight, Gases			33.47		24.45		28.92		24.45
Gas Volume, ACFM			219.6		801.7		23.5		1567.0
Gas Volume, SCFM			168		9,974		860		9,974
LIQUIDS:									
Water	18.02								
SOLIDS:									
Carbon	12.01								
Hydrogen	1.01								
Oxygen	16.00								
Nitrogen	14.01								
Sulfur	32.06								
Chlorides	35.45								
Ash									
Moisture	18.02								
TOTAL SOLIDS									
SORBENT:									
CaO	56.08								
CaCO3	100.09								
CaS	72.14								
CaSO4	136.14								
MgO	40.31								
MgCO3	84.32								
Inerts									
TOTAL SORBENT									
TOTAL FLOW, Lb/Hr			892		38,578		3,932		38,577
HEATING VALUE:									
Gas LHV, Btu/SCF					129				129
Gaseous Fuel LHV, MMBtu/hr					77.2				77.2
TEMPERATURE, F			600		270		120		1,000
PRESSURE, PSIA			23		257		600		263

Note 1: Stream 19 is a time averaged flow rate.

HEAT AND MATERIAL BALANCE - BASE CASE
UNDRIED SUFCO COAL WITH TRANSPORT DESULFURIZER

IDENTIFICATION	Molecular Weight	21 Limestone To Sulfator		22 (3) Sulfator System Flue Gas To Vent		23 Solids From Sulfator		24 (Note 1) Total Solids to Disposal	
		Wt%	Lb/Hr	Vol%	Lb/Hr	Wt%	Lb/Hr	Wt%	Lb/Hr
GASES:									
Carbon Monoxide	28.01			0.00	0				
Hydrogen	2.02			0.00	0				
Carbon Dioxide	44.01			9.65	18,033				
Methane	16.04			0.00	0				
Nitrogen	28.01			77.23	91,879				
Argon	39.95			0.89	1,507				
Oxygen	32.00			10.33	14,044				
Ammonia	17.03			0.00	1				
Hydrogen Sulfide	34.08			0.00	0				
Carbonyl Sulfide	60.08			0.00	0				
Sulfur Dioxide	64.06			0.01	37				
Water Vapor	18.02			1.88	1,438				
Hydrogen Chloride	36.46			0.00	0				
TOTAL GASES				100.00	126,939				
Gas Flow, Lb Moles/Hr					4,246.7				
Molecular Weight, Gases					29.89				
Gas Volume, ACFM					47301.8				
Gas Volume, SCFM					26,849				
LIQUIDS:									
Water	18.02								
SOLIDS:									
Carbon	12.01					0.74	34	1.28	87
Hydrogen	1.01					0.00	0	0.00	0
Oxygen	16.00					0.48	22	0.82	56
Nitrogen	14.01					0.30	14	0.50	34
Sulfur	32.06					0.00	0	0.01	0
Chlorides	35.45					0.00	0	0.00	0
Ash						98.47	4,463	97.40	6,619
Moisture	18.02					0.00	0	0.00	0
TOTAL SOLIDS						100.00	4,533	100.00	6,796
SORBENT:									
CaO	56.08	0.00	0			52.94	1,305	57.84	1,844
CaCO3	100.09	90.04	426			0.00	0	0.00	0
CaS	72.14	0.00	0			4.42	109	6.24	199
CaSO4	136.14	0.00	0			31.85	785	24.62	785
MgO	40.31	0.00	0			2.69	66	2.82	90
MgCO3	84.32	4.09	19			0.00	0	0.00	0
Inerts		5.87	28			8.09	199	8.47	270
TOTAL SORBENT		100.00	473			100.00	2,465	100.00	3,189
TOTAL FLOW, Lb/Hr			473		126,939		6,998		9,985
HEATING VALUE:									
Gas LHV, Btu/SCF					-				
Gaseous Fuel LHV, MMBtu/hr									
TEMPERATURE, F			50		350		1,600		(3) 210
PRESSURE, PSIA			20		13		17		13

Note 1: Temperature of stream 24 is calculated by blending stream 64 with the cooled sulfator solids stream.

HEAT AND MATERIAL BALANCE - BASE CASE
UNDRIED SUFCO COAL WITH TRANSPORT DESULFURIZER

IDENTIFICATION	Molecular Weight	25 Cyclone Fines to Gasifier		26 (3) Desulfurized Product Gas From Hot Gas Filter		27 (3) Hot Regen. Air to Transp. Regenerator		28 (3) Regeneration Air to Transp. Regenerator	
		Wt%	Lb/Hr	Vol%	Lb/Hr	Vol%	Lb/Hr	Vol%	Lb/Hr
GASES:									
Carbon Monoxide	28.01			23.91	88,418	0.00	0	0.00	0
Hydrogen	2.02			14.58	3,881	0.00	0	0.00	0
Carbon Dioxide	44.01			5.45	31,672	0.00	0	0.00	0
Methane	16.04			1.35	2,853	0.00	0	0.00	0
Nitrogen	28.01			48.70	180,095	78.00	626	78.00	626
Argon	39.95			0.56	2,940	0.90	10	0.90	10
Oxygen	32.00			0.00	0	20.82	191	20.82	191
Ammonia	17.03			0.02	43	0.00	0	0.00	0
Hydrogen Sulfide	34.08			0.00	9	0.00	0	0.00	0
Carbonyl Sulfide	60.08			0.00	0	0.00	0	0.00	0
Sulfur Dioxide	64.06			0.00	0	0.00	0	0.00	0
Water Vapor	18.02			5.43	12,926	0.29	1	0.29	1
Hydrogen Chloride	36.46			0.00	0	0.00	0	0.00	0
TOTAL GASES				100.00	322,837	100.00	828	100.00	828
Gas Flow, Lb Moles/Hr					13,202.1		28.6		28.6
Molecular Weight, Gases					24.45		28.92		28.92
Gas Volume, ACFM					13113.8		23.5		15.8
Gas Volume, SCFM					83,469		181		181
LIQUIDS:									
Water	18.02								
SOLIDS:									
Carbon	12.01	54.20	43,138						
Hydrogen	1.01	0.33	259						
Oxygen	16.00	0.70	557						
Nitrogen	14.01	0.41	325						
Sulfur	32.06	0.36	290						
Chlorides	35.45	0.00	0						
Ash		44.00	35,018						
Moisture	18.02	0.00	0						
TOTAL SOLIDS		100.00	79,587						
SORBENT:									
CaO	56.08	74.50	26,437						
CaCO3	100.09	0.00	0						
CaS	72.14	12.44	4,415						
CaSO4	136.14	0.00	0						
MgO	40.31	3.26	1,158						
MgCO3	84.32	0.00	0						
Inerts		9.79	3,475						
TOTAL SORBENT		100.00	35,485						
TOTAL FLOW, Lb/Hr			115,072		322,837		828		828
HEATING VALUE:									
Gas LHV, Btu/SCF					129				
Gaseous Fuel LHV, MMBtu/hr					646.1				
TEMPERATURE, F		(3)	1,790		1,000		1,100		650
PRESSURE, PSIA			292		263		340		360

HEAT AND MATERIAL BALANCE - BASE CASE
UNDRIED SUFCO COAL WITH TRANSPORT DESULFURIZER

IDENTIFICATION	Molecular Weight	29 (3) Desulf. Feed Cyc. Fines Transport Gas		30 Ash Transport Gas		31 Fines Transport Gas		32 (3) Product Gas to Gas Turbine	
		Vol%	Lb/Hr	Vol%	Lb/Hr	Vol%	Lb/Hr	Vol%	Lb/Hr
GASES:									
Carbon Monoxide	28.01	23.91	82	23.91	436	23.91	308	23.91	77,852
Hydrogen	2.02	14.58	4	14.58	19	14.58	14	14.58	3,417
Carbon Dioxide	44.01	5.45	29	5.45	156	5.45	110	5.45	27,887
Methane	16.04	1.35	3	1.35	14	1.35	10	1.35	2,512
Nitrogen	28.01	48.70	167	48.70	887	48.70	627	48.70	158,575
Argon	39.95	0.56	3	0.56	14	0.56	10	0.56	2,589
Oxygen	32.00	0.00	0	0.00	0	0.00	0	0.00	0
Ammonia	17.03	0.02	0	0.02	0	0.02	0	0.02	38
Hydrogen Sulfide	34.08	0.00	0	0.00	0	0.00	0	0.00	8
Carbonyl Sulfide	60.08	0.00	0	0.00	0	0.00	0	0.00	0
Sulfur Dioxide	64.06	0.00	0	0.00	0	0.00	0	0.00	0
Water Vapor	18.02	5.43	12	5.43	64	5.43	45	5.43	11,381
Hydrogen Chloride	36.46	0.00	0	0.00	0	0.00	0	0.00	0
TOTAL GASES		100.00	300	100.00	1,590	100.00	1,125	100.00	284,260
Gas Flow, Lb Moles/Hr			12.3		65.0		46.0		11,624.5
Molecular Weight, Gases			24.45		24.45		24.45		24.45
Gas Volume, ACFM			5.3		33.0		23.4		11546.8
Gas Volume, SCFM			78		411		291		73,495
LIQUIDS:									
Water	18.02								
SOLIDS:									
Carbon	12.01								
Hydrogen	1.01								
Oxygen	16.00								
Nitrogen	14.01								
Sulfur	32.06								
Chlorides	35.45								
Ash									
Moisture	18.02								
TOTAL SOLIDS									
SORBENT:									
CaO	56.08								
CaCO3	100.09								
CaS	72.14								
CaSO4	136.14								
MgO	40.31								
MgCO3	84.32								
Inerts									
TOTAL SORBENT									
TOTAL FLOW, Lb/Hr			300		1,590		1,125		284,260
HEATING VALUE:									
Gas LHV, Btu/SCF			129		129		129		129
Gaseous Fuel LHV, MMBtu/hr			0.6		3.2		2.3		568.9
TEMPERATURE, F			350		270 (3)		270 (3)		1,000
PRESSURE, PSIA			335		257 (3)		257 (3)		263

HEAT AND MATERIAL BALANCE - BASE CASE
UNDRIED SUFCO COAL WITH TRANSPORT DESULFURIZER

IDENTIFICATION	Molecular Weight	33 Low Pressure Transport Gas		34 △3 High Pressure Transport Gas		35 △3 BFW Blowdown From Sulfator Steam Drum		36 △3 Desulf. Feed Cyc. Fines to HGF	
		Vol%	Lb/Hr	Vol%	Lb/Hr	Wt%	Lb/Hr	Wt%	Lb/Hr
GASES:									
Carbon Monoxide	28.01	23.91	744	23.91	520			23.91	82
Hydrogen	2.02	14.58	33	14.58	23			14.58	4
Carbon Dioxide	44.01	5.45	266	5.45	186			5.45	29
Methane	16.04	1.35	24	1.35	17			1.35	3
Nitrogen	28.01	48.70	1,515	48.70	1,060			48.70	167
Argon	39.95	0.56	25	0.56	17			0.56	3
Oxygen	32.00	0.00	0	0.00	0			0.00	0
Ammonia	17.03	0.02	0	0.02	0			0.02	0
Hydrogen Sulfide	34.08	0.00	0	0.00	0			0.00	0
Carbonyl Sulfide	60.08	0.00	0	0.00	0			0.00	0
Sulfur Dioxide	64.06	0.00	0	0.00	0			0.00	0
Water Vapor	18.02	5.43	109	5.43	76			5.43	12
Hydrogen Chloride	36.46	0.00	0	0.00	0			0.00	0
TOTAL GASES		100.00	2,715	100.00	1,900			100.00	300
Gas Flow, Lb Moles/Hr			111.0		77.7				12.3
Molecular Weight, Gases			24.45		24.45				24.45
Gas Volume, ACFM			56.4		33.6				9.0
Gas Volume, SCFM			702		491				78
LIQUIDS:									
Water	18.02					100.00	854		
SOLIDS:									
Carbon	12.01							54.20	125
Hydrogen	1.01							0.33	1
Oxygen	16.00							0.70	2
Nitrogen	14.01							0.41	1
Sulfur	32.06							0.36	1
Chlorides	35.45							0.00	0
Ash								44.00	102
Moisture	18.02							0.00	0
TOTAL SOLIDS								100.00	231
SORBENT:									
CaO	56.08							74.50	25
CaCO3	100.09							0.00	0
CaS	72.14							12.44	4
CaSO4	136.14							0.00	0
MgO	40.31							3.26	1
MgCO3	84.32							0.00	0
Inerts								9.79	3
TOTAL SORBENT								100.00	34
TOTAL FLOW, Lb/Hr			2,715		1,900		854		565
HEATING VALUE:									
Gas LHV, Btu/SCF			129		129				129
Gaseous Fuel LHV, MMBtu/hr			5.4		3.8				0.6
TEMPERATURE, F			270		350		553		670
PRESSURE, PSIA			257 △3		335		1,075		276

HEAT AND MATERIAL BALANCE - BASE CASE
UNDRIED SUFCO COAL WITH TRANSPORT DESULFURIZER

IDENTIFICATION	Molecular Weight	37 Filter Solids From Screw Cooler		38 (3) Gas From Sulfator Cyclone		39 Flue Gas to BH Filter (3)		40 (Note 1) Pressurization Air Vent	
		Wt%	Lb/Hr	Vol%	Lb/Hr	Vol%	Lb/Hr	Vol%	Lb/Hr
GASES:									
Carbon Monoxide	28.01			0.00	0	0.00	0	0.00	0
Hydrogen	2.02			0.00	0	0.00	0	0.00	0
Carbon Dioxide	44.01			15.65	7,484	9.65	18,033	0.00	0
Methane	16.04			0.00	0	0.00	0	0.00	0
Nitrogen	28.01			76.52	23,292	77.23	91,879	78.00	2,970
Argon	39.95			0.88	382	0.89	1,507	0.90	49
Oxygen	32.00			3.67	1,276	10.33	14,044	20.82	906
Ammonia	17.03			0.00	1	0.00	1	0.00	0
Hydrogen Sulfide	34.08			0.00	0	0.00	0	0.00	0
Carbonyl Sulfide	60.08			0.00	0	0.00	0	0.00	0
Sulfur Dioxide	64.06			0.00	2	0.01	37	0.00	0
Water Vapor	18.02			3.28	641	1.88	1,438	0.29	7
Hydrogen Chloride	36.46			0.00	0	0.00	0	0.00	0
TOTAL GASES				100.00	33,078	100.00	126,939	100.00	3,932
Gas Flow, Lb Moles/Hr					1,086.6		4,246.7		136.0
Molecular Weight, Gases					30.44		29.89		28.92
Gas Volume, ACFM					27413.7		45215.0		1084.2
Gas Volume, SCFM					6,870		26,849		860
LIQUIDS:									
Water	18.02								
						Wt%			
SOLIDS:									
Carbon	12.01	54.20	2,656			2.35	53		
Hydrogen	1.01	0.33	16			0.00	0		
Oxygen	16.00	0.70	34			1.52	34		
Nitrogen	14.01	0.41	20			0.88	20		
Sulfur	32.06	0.36	18			0.01	0		
Chlorides	35.45	0.00	0			0.00	0		
Ash		44.00	2,156			95.24	2,156		
Moisture	18.02	0.00	0			0.00	0		
TOTAL SOLIDS		100.00	4900			100	2,264		
SORBENT:									
CaO	56.08	74.50	539			74.50	539		
CaCO3	100.09	0.00	0			0.00	0		
CaS	72.14	12.44	90			12.44	90		
CaSO4	136.14	0.00	0			0.00	0		
MgO	40.31	3.26	24			3.26	24		
MgCO3	84.32	0.00	0			0.00	0		
Inerts		9.79	71			9.79	71		
TOTAL SORBENT		100	724			100	724		
TOTAL FLOW, Lb/Hr			5,624		33,078		129,926		3,932
HEATING VALUE:									
Gas LHV, Btu/SCF					-		-		
Gaseous Fuel LHV, MMBtu/hr									
TEMPERATURE, F			(3) 500		1,600		350		120
PRESSURE, PSIA			263		15		14		13

Note 1 : Time averaged flow.

HEAT AND MATERIAL BALANCE - BASE CASE
UNDRIED SUFCO COAL WITH TRANSPORT DESULFURIZER

IDENTIFICATION	Molecular Weight	41 (3) Total BFW From Sec. 800		42 Recycle Gas To Gasifier		43 (Note 1) Ash Hopper Vent Gas (3)		44 (Note 1) Fines Hopper Vent Gas (3)	
		Wt%	Lb/Hr	Vol%	Lb/Hr	Vol%	Lb/Hr	Vol%	Lb/Hr
GASES:									
Carbon Monoxide	28.01			23.91	4,231	25.21	50	25.21	127
Hydrogen	2.02			14.58	186	15.37	2	15.37	6
Carbon Dioxide	44.01			5.45	1,516	5.75	18	5.75	45
Methane	16.04			1.35	137	1.42	2	1.42	4
Nitrogen	28.01			48.70	8,618	51.34	102	51.34	259
Argon	39.95			0.56	141	0.59	2	0.59	4
Oxygen	32.00			0.00	0	0.00	0	0.00	0
Ammonia	17.03			0.02	2	0.02	0	0.02	0
Hydrogen Sulfide	34.08			0.00	0	0.00	0	0.00	0
Carbonyl Sulfide	60.08			0.00	0	0.00	0	0.00	0
Sulfur Dioxide	64.06			0.00	0	0.00	0	0.00	0
Water Vapor	18.02			5.43	619	0.30	0	0.30	1
Hydrogen Chloride	36.46			0.00	0	0.00	0	0.00	0
TOTAL GASES				100.00	15,448	100.00	176	100.00	446
Gas Flow, Lb Moles/Hr					631.7		7.1		18.0
Molecular Weight, Gases					24.45		24.80		24.80
Gas Volume, ACFM					273.1		2.8		8.4
Gas Volume, SCFM					3,994		45		114
LIQUIDS:									
Water	18.02	100.00	157,995						
SOLIDS:									
Carbon	12.01								
Hydrogen	1.01								
Oxygen	16.00								
Nitrogen	14.01								
Sulfur	32.06								
Chlorides	35.45								
Ash									
Moisture	18.02								
TOTAL SOLIDS									
SORBENT:									
CaO	56.08								
CaCO3	100.09								
CaS	72.14								
CaSO4	136.14								
MgO	40.31								
MgCO3	84.32								
Inerts									
TOTAL SORBENT									
TOTAL FLOW, Lb/Hr			157,995		15,448		176		446
HEATING VALUE:									
Gas LHV, Btu/SCF					129		136		136
Gaseous Fuel LHV, MMBtu/hr					30.9		0.4		0.9
TEMPERATURE, F			240		(3) 350		230		230
PRESSURE, PSIA			1,075		(3) 335		310		263

Note: 1. Streams 43 and 44 are time averaged flow rates.

HEAT AND MATERIAL BALANCE - BASE CASE
UNDRIED SUFCO COAL WITH TRANSPORT DESULFURIZER

IDENTIFICATION	Molecular Weight	45 (3) BFW to Air Precooler		46 (3) Ash To Collection Hopper		47 (3) BFW to Recycle Gas Cooler		48 (3) Recycle Gas To Filter	
		Wt%	Lb/Hr	Wt%	Lb/Hr	Wt%	Lb/Hr	Vol%	Lb/Hr
GASES:									
Carbon Monoxide	28.01			23.91	438			23.91	438
Hydrogen	2.02			14.58	19			14.58	19
Carbon Dioxide	44.01			5.45	157			5.45	157
Methane	16.04			1.35	14			1.35	14
Nitrogen	28.01			48.70	893			48.70	893
Argon	39.95			0.56	15			0.56	15
Oxygen	32.00			0.00	0			0.00	0
Ammonia	17.03			0.02	0			0.02	0
Hydrogen Sulfide	34.08			0.00	0			0.00	0
Carbonyl Sulfide	60.08			0.00	0			0.00	0
Sulfur Dioxide	64.06			0.00	0			0.00	0
Water Vapor	18.02			5.43	64			5.43	64
Hydrogen Chloride	36.46			0.00	0			0.00	0
TOTAL GASES				100.00	1,600			100.00	1600
Gas Flow, Lb Moles/Hr					65.4				65.4
Molecular Weight, Gases					24.45				24.45
Gas Volume, ACFM					36.2				36.2
Gas Volume, SCFM					414				414
LIQUIDS:									
Water	18.02	100.00	51,550			100.00	62,887		
SOLIDS:									
Carbon	12.01			27.19	1,685				
Hydrogen	1.01			0.07	5				
Oxygen	16.00			0.35	22				
Nitrogen	14.01			0.22	14				
Sulfur	32.06			0.17	10				
Chlorides	35.45			0.00	0				
Ash				72.00	4,463				
Moisture	18.02			0.00	0				
TOTAL SOLIDS				100.00	6,199				
SORBENT:									
CaO	56.08			74.50	1305.26				
CaCO3	100.09			0.00	0.00				
CaS	72.14			12.44	217.98				
CaSO4	136.14			0.00	0.00				
MgO	40.31			3.26	57.17				
MgCO3	84.32			0.00	0.00				
Inerts				9.79	171.59				
TOTAL SORBENT				100.00	1752.00				
TOTAL FLOW, Lb/Hr			51,550		9,551		62,887		1,600
HEATING VALUE:									
Gas LHV, Btu/SCF									
Gaseous Fuel LHV, MMBtu/hr									
TEMPERATURE, F			240		500		240		500
PRESSURE, PSIA			1,075		310		1,075		310

HEAT AND MATERIAL BALANCE - BASE CASE
UNDRIED SUFCO COAL WITH TRANSPORT DESULFURIZER

IDENTIFICATION	Molecular Weight	49 (3) Air To Sulfator		50 (3) Steam From Product Gas Trim Cooler		51 (3) Net Steam From Sulfator Steam Drum		52 (3) Steam From Product Gas Cooler	
		Vol%	Lb/Hr	Vol%	Lb/Hr	Vol%	Lb/Hr	Vol%	Lb/Hr
GASES:									
Carbon Monoxide	28.01	0.00	0						
Hydrogen	2.02	0.00	0						
Carbon Dioxide	44.01	0.00	0						
Methane	16.04	0.00	0						
Nitrogen	28.01	78.00	20,677						
Argon	39.95	0.90	339						
Oxygen	32.00	20.82	6,305						
Ammonia	17.03	0.00	0						
Hydrogen Sulfide	34.08	0.00	0						
Carbonyl Sulfide	60.08	0.00	0						
Sulfur Dioxide	64.06	0.00	0						
Water Vapor	18.02	0.29	49	100.00	34,182	100.00	42,704	100.00	59,297
Hydrogen Chloride	36.46	0.00	0						
TOTAL GASES		100.00	27,370	100.00	34,182	100.00	42,704	100.00	59,297
Gas Flow, Lb Moles/Hr			946.4		1,897.4		2,370.5		3,291.5
Molecular Weight, Gases			28.92		18.02		18.02		18.02
Gas Volume, ACFM			4486.3		239.8		299.6		416.0
Gas Volume, SCFM			5,983		11,998		14,989		20,813
LIQUIDS:									
Water	18.02								
SOLIDS:									
Carbon	12.01								
Hydrogen	1.01								
Oxygen	16.00								
Nitrogen	14.01								
Sulfur	32.06								
Chlorides	35.45								
Ash									
Moisture	18.02								
TOTAL SOLIDS									
SORBENT:									
CaO	56.08								
CaCO3	100.09								
CaS	72.14								
CaSO4	136.14								
MgO	40.31								
MgCO3	84.32								
Inerts									
TOTAL SORBENT									
TOTAL FLOW, Lb/Hr			27,370		34,182		42,704		59,297
HEATING VALUE:									
Gas LHV, Btu/SCF									
Gaseous Fuel LHV, MMBtu/hr									
TEMPERATURE, F			150		553		553		553
PRESSURE, PSIA			23		1,075		1,075		1,075

HEAT AND MATERIAL BALANCE - BASE CASE
UNDRIED SUFCO COAL WITH TRANSPORT DESULFURIZER

IDENTIFICATION	Molecular Weight	53 (3) Total Blowdown to Sec. 800		54 (3) Steam From Gasifier Steam Drum		55 (3) Total Gas Flow To HGF		56 (3) Pri. Solids Cooler Fluidization Air	
		Wt%	Lb/Hr	Vol%	Lb/Hr	Vol%	Lb/Hr	Vol%	Lb/Hr
GASES:									
Carbon Monoxide	28.01					23.89	87,124	0.00	0
Hydrogen	2.02					14.57	3,824	0.00	0
Carbon Dioxide	44.01					5.45	31,209	0.00	0
Methane	16.04					1.35	2,812	0.00	0
Nitrogen	28.01					48.66	177,460	78.00	738
Argon	39.95					0.56	2,897	0.90	12
Oxygen	32.00					0.00	0	20.82	225
Ammonia	17.03					0.02	42	0.00	0
Hydrogen Sulfide	34.08					0.00	9	0.00	0
Carbonyl Sulfide	60.08					0.00	0	0.00	0
Sulfur Dioxide	64.06					0.00	0	0.00	0
Water Vapor	18.02			100.00	112,193	5.51	12,912	0.29	2
Hydrogen Chloride	36.46					0.00	0	0.00	0
TOTAL GASES				100.00	112,193	100.00	318,289		977
Gas Flow, Lb Moles/Hr					6,227.8		13018.7		33.8
Molecular Weight, Gases					18.02		24.45		28.92
Gas Volume, ACFM					787.1		12597.7		
Gas Volume, SCFM					39,380		82,310		
LIQUIDS:									
Water	18.02	100.00	3,098						
SOLIDS:						Wt%			
Carbon	12.01					54.20	2,656		
Hydrogen	1.01					0.33	16		
Oxygen	16.00					0.70	34		
Nitrogen	14.01					0.41	20		
Sulfur	32.06					0.36	18		
Chlorides	35.45					0.00	0		
Ash						44.00	2,156		
Moisture	18.02					0.00	0		
TOTAL SOLIDS						100.00	4,900		
SORBENT:									
CaO	56.08					74.50	539		
CaCO3	100.09					0.00	0		
CaS	72.14					12.44	90		
CaSO4	136.14					0.00	0		
MgO	40.31					3.26	24		
MgCO3	84.32					0.00	0		
Inerts						9.79	71		
TOTAL SORBENT						100.00	724		
TOTAL FLOW, Lb/Hr			3,098		112,193		323,913		977
HEATING VALUE:									
Gas LHV, Btu/SCF							129		
Gaseous Fuel LHV, MMBtu/hr							637.0		
TEMPERATURE, F			553		553		1,011		110
PRESSURE, PSIA			1,075		1,075		272		155

HEAT AND MATERIAL BALANCE - BASE CASE
UNDRIED SUFCO COAL WITH TRANSPORT DESULFURIZER

IDENTIFICATION	Molecular Weight	57 (3) Total BFW To Sulfator HRSG		58 (3) Total Steam Export to Sec. 800		59 (3) Air To Fines Combustor		60 (3) Fines Combustor Effluents To HRSG	
		Wt%	Lb/Hr	Vol%	Lb/Hr	Vol%	Lb/Hr	Vol%	Lb/Hr
GASES:									
Carbon Monoxide	28.01					0.00	0	0.00	0
Hydrogen	2.02					0.00	0	0.00	0
Carbon Dioxide	44.01					0.00	0	9.65	18,033
Methane	16.04					0.00	0	0.00	0
Nitrogen	28.01					78.00	67,957	77.23	91,879
Argon	39.95					0.90	1,115	0.89	1,507
Oxygen	32.00					20.82	20,722	10.33	14,044
Ammonia	17.03					0.00	0	0.00	1
Hydrogen Sulfide	34.08					0.00	0	0.00	0
Carbonyl Sulfide	60.08					0.00	0	0.00	0
Sulfur Dioxide	64.06					0.00	0	0.01	37
Water Vapor	18.02			100.00	154,897	0.29	160	1.88	1,438
Hydrogen Chloride	36.46					0.00	0	0.00	0
TOTAL GASES				100.00	154,897	100.00	89,954	100.00	126,939
Gas Flow, Lb Moles/Hr					8,598.2		3,110.3		4,246.7
Molecular Weight, Gases					18.02		28.92		29.89
Gas Volume, ACFM					1,294.2		19268.7		117542.6
Gas Volume, SCFM					54,369		19,665		26,849
LIQUIDS:									
Water	18.02	100.00	43,558						
								Wt%	
SOLIDS:									
Carbon	12.01							2.35	53
Hydrogen	1.01							0.00	0
Oxygen	16.00							1.52	34
Nitrogen	14.01							0.88	20
Sulfur	32.06							0.01	0
Chlorides	35.45							0.00	0
Ash								95.24	2,156
Moisture	18.02							0.00	0
TOTAL SOLIDS								100.00	2,264
SORBENT:									
CaO	56.08							74.50	539
CaCO3	100.09							0.00	0
CaS	72.14							12.44	90
CaSO4	136.14							0.00	0
MgO	40.31							3.26	24
MgCO3	84.32							0.00	0
Inerts								9.79	71
TOTAL SORBENT								100.00	724.00
TOTAL FLOW, Lb/Hr			43,558		154,897		89,954		129,926
HEATING VALUE:									
Gas LHV, Btu/SCF									
Gaseous Fuel LHV, MMBtu/hr									
TEMPERATURE, F			240		600		150		1,800
PRESSURE, PSIA			1,075		1,020		18		15

HEAT AND MATERIAL BALANCE - BASE CASE
UNDRIED SUFCO COAL WITH TRANSPORT DESULFURIZER

IDENTIFICATION	Molecular Weight	61 (3) Cooled Extraction Air To C201		62 (3) BFW/Steam From E607 To SG401		63 (3) Total Desulfurizer Aeration Gas		64 Sulfator Fines From BH Filter	
		Vol%	Lb/Hr	Vol%	Lb/Hr	Vol%	Lb/Hr	Wt%	Lb/Hr
GASES:									
Carbon Monoxide	28.01	0.00	0			23.91	3,600		
Hydrogen	2.02	0.00	0			14.58	158		
Carbon Dioxide	44.01	0.00	0			5.45	1,289		
Methane	16.04	0.00	0			1.35	116		
Nitrogen	28.01	78.00	163,304			48.70	7,332		
Argon	39.95	0.90	2,678			0.56	120		
Oxygen	32.00	20.82	49,797			0.00	0		
Ammonia	17.03	0.00	0			0.02	2		
Hydrogen Sulfide	34.08	0.00	0			0.00	0		
Carbonyl Sulfide	60.08	0.00	0			0.00	0		
Sulfur Dioxide	64.06	0.00	0			0.00	0		
Water Vapor	18.02	0.29	385	100.00	196	5.43	526		
Hydrogen Chloride	36.46	0.00	0			0.00	0		
TOTAL GASES		100.00	216,164	100.00	196	100	13,144		
Gas Flow, Lb Moles/Hr			7,474		11		538		
Molecular Weight, Gases			28.92		18.02		24.45		
Gas Volume, ACFM			4912.8		1.4		232.3		
Gas Volume, SCFM			47,255		69		3,398		
LIQUIDS:									
Water	18.02								
SOLIDS:									
Carbon	12.01							2.35	53
Hydrogen	1.01							0.00	0
Oxygen	16.00							1.52	34
Nitrogen	14.01							0.88	20
Sulfur	32.06							0.01	0
Chlorides	35.45							0.00	0
Ash								95.24	2,156
Moisture	18.02							0.00	0
TOTAL SOLIDS								100	2,264
SORBENT:									
CaO	56.08							74.50	539
CaCO3	100.09							0.00	0
CaS	72.14							12.44	90
CaSO4	136.14							0.00	0
MgO	40.31							3.26	24
MgCO3	84.32							0.00	0
Inerts								9.79	71
TOTAL SORBENT								100	724
TOTAL FLOW, Lb/Hr			216,164		196		13,144		2,988
HEATING VALUE:									
Gas LHV, Btu/SCF							129		
Gaseous Fuel LHV, MMBtu/hr							26.3		
TEMPERATURE, F			110		553		350		(3) 350
PRESSURE, PSIA			155		1,075		335		14

HEAT AND MATERIAL BALANCE - BASE CASE
UNDRIED SUFCO COAL WITH TRANSPORT DESULFURIZER

IDENTIFICATION	Molecular Weight	65 (3) Cooled Product Gas To Desulfurizer		66 (Note 1) (3) Sorbent Recirculation to Desulfurizer		67 (3) Spent Sorbent To Regenerator		68 (3) Sorbent Regenerant Gas	
		Vol%	Lb/Hr	Wt%	Lb/Hr	Wt%	Lb/Hr	Vol%	Lb/Hr
GASES:									
Carbon Monoxide	28.01	23.89	82,996					0.00	0
Hydrogen	2.02	14.57	3,643					0.00	0
Carbon Dioxide	44.01	5.44	29,708					0.00	0
Methane	16.04	1.35	2,679					0.00	0
Nitrogen	28.01	48.65	169,052					83.81	626
Argon	39.95	0.56	2,760					0.96	10
Oxygen	32.00	0.00	0					0.00	0
Ammonia	17.03	0.02	40					0.00	0
Hydrogen Sulfide	34.08	0.03	127					0.00	0
Carbonyl Sulfide	60.08	0.00	30					0.00	0
Sulfur Dioxide	64.06	0.00	0					14.91	255
Water Vapor	18.02	5.50	12,284					0.31	1
Hydrogen Chloride	36.46	0.00	0					0.00	0
TOTAL GASES		100.00	303,319					99.99	892
Gas Flow, Lb Moles/Hr			12,404						26.65
Molecular Weight, Gases			24						33.47
Gas Volume, ACFM			11989.2						32.1
Gas Volume, SCFM			78,425						168
LIQUIDS:									
Water	18.02								
		Wt%							
SOLIDS:									
Carbon	12.01	54.20	2,531						
Hydrogen	1.01	0.33	15						
Oxygen	16.00	0.70	33						
Nitrogen	14.01	0.41	19						
Sulfur	32.06	0.36	17						
Chlorides	35.45	0.00	0						
Ash		44.00	2,054						
Moisture	18.02	0.00	0						
TOTAL SOLIDS		100.00	4,669						
SORBENT:									
CaO	56.08	74.50	514						
CaCO3	100.09	0.00	0						
CaS	72.14	12.44	86						
CaSO4	136.14	0.00	0						
MgO	40.31	3.26	23						
MgCO3	84.32	0.00	0						
Inerts		9.79	68						
TOTAL SORBENT		100.00	690		694,000		9,064		
TOTAL FLOW, Lb/Hr			308,678		694,000		9,064		892
HEATING VALUE:									
Gas LHV, Btu/SCF			129						
Gaseous Fuel LHV, MMBtu/hr			607.4						
TEMPERATURE, F			1,032		1,013		1,013		1,368
PRESSURE, PSIA			276		274		278		272

Note 1: Sorbent referred to in streams 66, 67, and 69 is the external desulfurizer sorbent.

HEAT AND MATERIAL BALANCE - BASE CASE
UNDRIED SUFCO COAL WITH TRANSPORT DESULFURIZER

IDENTIFICATION	Molecular Weight	69 (3) Regenerated Sorbent To Desulfurizer		70 (3) Desulf Standpipe Aeration Gas		71 (3) Natural Gas To Fines Combustor		72 (3) Steam From Pri. Solids Cooler	
		Wt%	Lb/Hr	Vol%	Lb/Hr	Vol%	Lb/Hr	Vol%	Lb/Hr
GASES:									
Carbon Monoxide	28.01			23.91	644				
Hydrogen	2.02			14.58	28				
Carbon Dioxide	44.01			5.45	231				
Methane	16.04			1.35	21				
Nitrogen	28.01			48.70	1,312				
Argon	39.95			0.56	21				
Oxygen	32.00			0.00	0				
Ammonia	17.03			0.02	0				
Hydrogen Sulfide	34.08			0.00	0				
Carbonyl Sulfide	60.08			0.00	0				
Sulfur Dioxide	64.06			0.00	0				
Water Vapor	18.02			5.43	94			100.00	18,518
Hydrogen Chloride	36.46			0.00	0				
TOTAL GASES		--		100.00	2,352		146	100.00	18,518
Gas Flow, Lb Moles/Hr					96		8		1,028
Molecular Weight, Gases					24.45		17.20		18.02
Gas Volume, ACFM					41.6		10.71		129.9
Gas Volume, SCFM					608		54		6,500
LIQUIDS:									
Water	18.02								
SOLIDS:									
Carbon	12.01								
Hydrogen	1.01								
Oxygen	16.00								
Nitrogen	14.01								
Sulfur	32.06								
Chlorides	35.45								
Ash									
Moisture	18.02								
TOTAL SOLIDS									
SORBENT:									
CaO	56.08								
CaCO3	100.09								
CaS	72.14								
CaSO4	136.14								
MgO	40.31								
MgCO3	84.32								
Inerts									
TOTAL SORBENT			9,000						
TOTAL FLOW, Lb/Hr			9,000		2,352		146		18,518
HEATING VALUE:									
Gas LHV, Btu/SCF					129		936		
Gaseous Fuel LHV, MMBtu/hr					4.7		3.0		
TEMPERATURE, F			1,368		350		52		553
PRESSURE, PSIA			277		335		73		1,075

HEAT AND MATERIAL BALANCE - BASE CASE
UNDRIED SUFCO COAL WITH TRANSPORT DESULFURIZER

IDENTIFICATION	Molecular Weight	73 Aeration Rec. Gas to HGF Bottom Cone		74 Desulfurizer J-leg Aeration Gas	
		Vol%	Lb/Hr	Vol%	Lb/Hr
GASES:					
Carbon Monoxide	28.01	23.91	27	23.91	1,833
Hydrogen	2.02	14.58	1	14.58	80
Carbon Dioxide	44.01	5.45	10	5.45	657
Methane	16.04	1.35	1	1.35	59
Nitrogen	28.01	48.70	56	48.70	3,733
Argon	39.95	0.56	1	0.56	61
Oxygen	32.00	0.00	0	0.00	0
Ammonia	17.03	0.02	0	0.02	1
Hydrogen Sulfide	34.08	0.00	0	0.00	0
Carbonyl Sulfide	60.08	0.00	0	0.00	0
Sulfur Dioxide	64.06	0.00	0	0.00	0
Water Vapor	18.02	5.43	4	5.43	268
Hydrogen Chloride	36.46	0.00	0	0.00	0
TOTAL GASES		100	100	100.00	6,692
Gas Flow, Lb Moles/Hr			4.09		274
Molecular Weight, Gases			24.45		24.45
Gas Volume, ACFM			1.77		118.3
Gas Volume, SCFM			25.85		1,730
LIQUIDS:					
Water	18.02				
SOLIDS:					
Carbon	12.01				
Hydrogen	1.01				
Oxygen	16.00				
Nitrogen	14.01				
Sulfur	32.06				
Chlorides	35.45				
Ash					
Moisture	18.02				
TOTAL SOLIDS					
SORBENT:					
CaO	56.08				
CaCO3	100.09				
CaS	72.14				
CaSO4	136.14				
MgO	40.31				
MgCO3	84.32				
Inerts					
TOTAL SORBENT					
TOTAL FLOW, Lb/Hr			100		6,692
HEATING VALUE:					
Gas LHV, Btu/SCF			129		129
Gaseous Fuel LHV, MMBtu/hr			0.2		13.4
TEMPERATURE, F			350		350
PRESSURE, PSIA			335		335